

PACIFIC SEABIRDS



A Publication of the Pacific Seabird Group

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Dedicated To The Study And Conservation Of Pacific Seabirds And Their Environment

The Pacific Seabird Group (PSG) was formed in 1972 out of a need for better communication among Pacific seabird researchers. The Group coordinates and stimulates the field activities of members involved in research and informs its members and the general public of conservation issues relating to Pacific seabirds and the marine environment. Group meetings are held annually and the PSG publication, *Pacific Seabirds* (formerly the *PSG Bulletin*), is issued biannually. Current activities include involvement in seabird sanctuaries, coastal surveys, seabird/fisheries interactions, and legislation. Policy statements are issued on conservation issues of critical importance. Although PSG's primary area of interest is the west coast of North America and adjacent areas of the Pacific Ocean, it is hoped that seabird enthusiasts in other parts of the world will join and participate in PSG. PSG is a member of the U. S. Section of the International Council for Bird Preservation. Annual dues for membership are \$20 (individual and family); \$13 (student, undergraduate and graduate); and \$600 (Life Membership, payable in six \$100 installments). Dues are payable to the Treasurer (see Membership page for details and application).

Pacific Seabirds

Pacific Seabirds (ISSN 1089-6317) is published twice a year, in the spring and fall, and contains news of interest to PSG members, including regional seabird research, conservation news, and abstracts of papers presented at the annual meeting. *Pacific Seabirds* is an outlet for the results of scientific research, as well as articles and shorter items on seabird conservation, seabird research activities, and other topics related to the objectives of PSG. All materials should be submitted to the Editor, while conservation-related material should be submitted to the Vice-Chair for Conservation. Back issues of the *Bulletin* or *Pacific Seabirds* may be ordered from the treasurer: please remit \$2.50 each for Vols.1-8 (1974-1981) and \$5.00 each for Vol. 9 and later (see Membership Application for details and order form).

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FORUM

The Publications Of The Pacific Seabird Group: Direction, Potential And Opportunity

The Pacific Seabird Group, now approaching its 25th year of service, has established its presence through the hosting of an annual meeting, the activities of the executive council and its associated committees, and through its publications. The last is expressed twice-yearly through the publication of *Pacific Seabirds* (formerly *Pacific Seabird Group Bulletin*) and the publication of symposia held at annual meetings. This successful configuration continues but the publication side is being refined and supplemented to further the professional standing of the Pacific Seabird Group, all-the-while offering more opportunities and information to Pacific Seabird Group members.

There is a moderately long-standing debate within the Pacific Seabird Group that continues today, wherein a portion of the membership would like to see the group publish a formal seabird journal while others are opposed for a variety of reasons, not the least of which would be the impact of such an undertaking on the group's limited resources, now well used for other projects. To move forward a proposal was presented to the Executive Council, and approved, at the annual meeting in Sacramento that called for 1) the renaming of the bulletin, *Pacific Seabirds*, retaining the then present contents of the bulletin but to publish short technical papers and longer technical review articles, 2) continue with the Symposium series, and 3) initiate a Technical Publication series for items otherwise not appropriate for *Pacific Seabirds* or a symposium. All contributions to these publications were to be subject to peer review. All three are moving forward with more, and less, success.

Pacific Seabirds is starting to attract both short technical papers and longer review articles, as evident in this issue. Effort is being given to encourage the submission of manuscripts, including technical papers and review articles. Thus, the opportunity for members of the Pacific Seabird Group to both publish their works and to help build the stature of *Pacific Seabirds* and PSG.

My long term goal as Editor is to build the technical aspects of *Pacific Seabirds*

through publications while maintaining the balance between the technical side and the general but none-the-less important information traditionally included in *Pacific Seabirds*. This includes, Abstracts of meeting papers, PSG News, Bulletin Board, Regional Reports, committee reports, notices, etc. Here too effort is being made to expand the information made available to the membership, especially activities from the Pacific Ocean basin and beyond relating to marine birds and their environment potentially of interest to, but not normally involving, PSG members.

The Symposia of the Pacific Seabird Group is a successful series that now includes eight published symposia, with an additional symposium (sea ducks) now nearing completion and another in preparation (twenty-five years of change in seabirds and their environment) scheduled for the 25th annual PSG meeting. Any PSG member can propose a symposium, but they must be prepared to assume all the responsibilities related to the successful completion of a symposium. To this end symposium guidelines are now being prepared to help and guide symposia organizers. The ultimate goal is to produce, and publish if appropriate, high quality symposia that reflect well on the members of the Pacific Seabird Group.

The Technical Publications series is the newest element of the Pacific Seabird Group publication suite. The series is designed to accept a wide variety of potential publications, of varying length and subject matter. This includes manuscripts of interest and importance, yet unlikely to find other "more traditional" outlets. Although several projects have been discussed, to date only one manuscript has been submitted for consideration of publication. Suggested projects include seabird catalogs, catalogs of seabird colony photographs, seabird databases, regional faunal works, conservation reports, protocols, workshop proceedings, etc. Here again the opportunity afforded PSG members to publish the results of their projects is available and only awaits their initiative.

The increased costs associated with traditional publications (journals, books,

catalogs, etc.) and the widespread availability of multimedia formats allows greater flexibility in our ability to publish works, and to do so more economically. There is little doubt that in the future PSG will publish utilizing the compact disk format, especially for such things as databases and catalogs, especially those that involve large numbers of photographs.

One of the goals of researchers should be to insure that their results are available in the distant future: we have an obligation to archive our information for use in the future. This includes field notes, maps, photographs, video, sound recordings, data sets, data analyses, etc. One of the purposes of the Technical Publication series can be to help fulfill this responsibility. The use of compact disks and the print format allows the deposition of the publications in traditional repositories, and the purposeful placement of such items in multiple sites such as museums, libraries, archives and laboratories, and with interested parties.

The latest development on the publication front involves the establishment of a Pacific Seabird Group web site (see inside front cover for address). This obviously allows the Pacific Seabird Group to reach a much broader and non-traditional audience with our messages, information and products. All members should visit the site and pass your thoughts about the site to the Executive Council. The site could be expanded to include past issues of *Pacific Seabirds*, protocols, resolutions, pictures of seabirds, selected databases, and other items of interest. Although items can be placed on the web site, that is not a substitute for the continued archiving of important data sets and information, as the web is ephemeral, transient to its core.

There are many opportunities for Pacific Seabird Group members to publish their works, and to help enhance the professional standing of the Pacific Seabird Group, and in so doing, their self. The initiative has to come from you!

Steven M. Speich, Editor, *Pacific Seabirds* and Coordinator, Publications Committee

REVIEW ARTICLE

Seabird By-Catch In Longline Fisheries by Angela K. Kalmer, Rodney M. Fujita and Charles F. Wurster

Commercial marine fisheries have encountered a number of serious problems in recent years. Populations of target fish species have been depleted by overfishing beyond sustainability within many of the world's major fisheries, while non-target species have been significantly damaged (Safina 1995, Parfit 1995). Some by-catch problems, such as turtles in shrimp nets and dolphins in tuna nets, have received high levels of publicity and international attention in recent years and are on their way to being solved. Less well-known is the incidental, yet widespread and sometimes catastrophic mortality of seabirds, which are being hooked and drowned on longlines worldwide, especially in the southern hemisphere (Brothers 1991, Gales 1993, Murray et al. 1993). Seabirds are killed in the tuna, sablefish, swordfish, broadbill, hake and other longline fisheries. Seabird by-catch poses a serious threat to the survival of numerous populations of albatrosses (family Diomedaeidae) and petrels (family Procellariidae).

Longlining Operations

Longlines vary in length, number of hooks, and the methods by which they are set and hauled. In the Japanese tuna fishery, each longline vessel sets a mainline that is between 100 and 130 kilometers (60 to 80 miles) long (Safina 1995, Brothers 1991, Murray et al. 1993). Attached to the mainline are 40-meter unweighted branch lines carrying fish- or squid-baited hooks. It takes about five hours to set the lines which carry a total of 2,400 to 3,000 hooks (Brothers 1991, Anon. 1991). The lines are tossed into the water from the stern of a slowly-moving vessel. The baited hooks then sink to a depth of 60 to 300 meters (Anon. 1991), where they stay for approximately five hours of "soak time" to catch fish. Then, for the next twelve hours, the lines are hauled aboard (Murray et al. 1993, Anon. 1991). This set-soak-haul cycle continues repeatedly throughout a fishing voyage. The characteristics of deep-water (demersal) longline fishing are different from those outlined above. The lines are generally of shorter length, ranging from one-half mile to ten

miles long, but they tend to carry more hooks (Brothers 1995, C. Oliver, pers. comm.). In the US North Pacific longline fisheries, longlines range from 0.5 miles to several miles in length, with gangion lines with hooks every 3 to 8 feet (C. Oliver, pers. comm.).

Seabirds Get Hooked And Drown

Seabirds follow fishing vessels seeking food, not because there is a shortage of natural food but because they associate the vessels with an easy food source (Brothers 1996), without recognizing the high risks involved. While some birds escape with a free meal, many seabirds get hooked, pulled under water and drowned in their attempts to retrieve baits from the hooks. Each piece of bait is accessible to seabirds for about ten seconds, from the moment the baited hook is tossed into the water until it sinks out of reach (Brothers 1991). A hooked bird can sometimes act as a float, making neighboring hooks accessible to birds for a longer time. In one instance, 22 birds were caught in a row on consecutive hooks (Brothers 1995). Although most seabirds get hooked during the setting of fishing lines, they can also get caught during hauling.

Impacts Of By-Catch On Seabird Populations

According to a 1993 report commissioned by the Australian Nature Conservation Agency, longlining mortality has been documented for 12 of the 14 species of albatross, and longlining is thought to be contributing substantially to the population declines of at least six albatross species (Gales 1993). Though the albatrosses have no natural predators of any consequence other than humans (Tickell 1970), the human threat may be enough to drive some species to extinction.

The first study to quantify the impacts of longlining on seabirds took place in 1988. It was estimated that 44,000 albatrosses were killed annually on Japanese longlines in the Southern Bluefin Tuna fishery in the Southern Ocean (Brothers 1991).

Declining numbers of Wandering Albatrosses (*Diomedea exulans*) in the

South Georgia and Crozet islands, which represent 40% of the world population, have been attributed to tuna longline mortality (Gales 1993, CCAMLR 1994a, BirdLife International 1995). In total, an estimated 10% of the world population of Wandering Albatross is killed every year on longlines (Brothers 1996). Mortality on longlines exerts a powerful force on the population dynamics of this species because it can push the adult survival rate below the 96% threshold required to maintain a stable population (Weimerskirch & Jouventin 1987, Croxall et al. 1990).

The total population size of the Amsterdam Albatross was estimated to be 65 birds in 1993 (Gales 1993), rendering the species extremely sensitive to any longline mortality.

The seabird by-catch problem is greatest in, but by no means confined to, the southern hemisphere. The 120 vessels of the Hawaii-based Bigeye Tuna (*Thunnus obesus*) and Broad-billed swordfish (*Xiphias gladius*) longline fleet killed a total of 3,100 and 3,700 albatrosses in 1994 and 1995, respectively, according to NMFS (B. Skillman, pers. comm.). Laysan Albatrosses (*D. immutabilis*) and Black-footed Albatrosses (*D. nigripes*) are killed in these fisheries, and Black-footed Albatross populations have experienced recent declines in the three Hawaiian locations monitored by US Fish & Wildlife Service (Flint 1995). In the Bering Sea and Gulf of Alaska groundfish longline fisheries, an estimated 34,676 seabirds were killed between 1990 and 1993, including Laysan and Black-footed albatrosses (NMFS 1995). Documented kills of four endangered Short-tailed Albatrosses (*D. albatrus*) have occurred in Alaskan waters since 1983 (NPFMC 1994, P. Gould pers. comm.).

Albatrosses and other seabirds are particularly susceptible to human-induced mortality because, in general, they have evolved a life strategy which involves delayed maturity (average age of first breeding is 10 years), high natural survival rates and low reproductive rates (only one chick per breeding season) (Gales 1993). Albatross chicks are highly

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dependent on both parents for egg incubation, protection and feeding during their first year of life (Gales 1993, Murray et al. 1993). When longlines kill a breeding adult, its only chick will starve to death, and its mate's breeding success will be reduced in successive years while it searches for a new mate. Because juveniles are disproportionately killed on longlines, breeding adults may become scarce years later (Robertson 1995).

In addition to the effects on albatrosses, longlines also kill petrels, fulmars, shearwaters, gannets, kittiwakes, penguins and skuas. Special concern for the White-chinned Petrel (*Procellaria aequinoctialis*) has been expressed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) because this species is frequently caught during night setting (CCAMLR 1995a). One example of a strong correlation between longline mortality and a population decline is the 50% decline in Southern Giant Petrels (*Macronectes giganteus*) at Heard Island between 1987 and 1993 (Robertson 1995).

Economic Impacts

Seabird by-catch is not only a conservation issue. It is also an economic issue. Bait loss to seabirds costs money in terms of the cost of bait as well as the opportunity cost of not catching any fish. Hooks without bait and hooks with birds attached do not successfully catch fish. The economic costs of forgone fish are substantial considering, for example, the high prices paid for premium tuna in Japan, ranging from \$6,500 to \$11,000 or more for a single fish (Reid 1995). As a result, longline vessels that reduce their seabird by-catch may gain an economic advantage due to increased fishing efficiency.

Fishermen Involvement

Many fishermen are concerned about this problem, and some have voluntarily adopted effective measures to reduce seabird mortality (Anon. 1991, Brothers 1993, Robertson 1995). In a recent US development, the North Pacific Longline Association, an industry trade organization, proposed that techniques developed in the southern hemisphere be adopted by longliners in the North Pacific. To protect seabirds they suggested that such regulations be applied off Alaska by the North Pacific Fishery Management Council for 1997. Cooperative moves by fishermen themselves offer a preferable and quicker

solution to this problem than would an adversarial process. No one really wants to be killing these birds, and fishermen must believe in the problem, believe in the solutions, and willingly employ the solutions, since enforcement over the far-ranging global longlining fleet would be difficult or impossible.

Expansion In Longline Fleet

The longline fleet has undergone enormous growth in the late twentieth century. Between 1955 and 1987, for example, the Japanese tuna fishery in the Southern Ocean underwent a 5000-fold expansion in fishing effort, growing from 20,000 to over 100 million hooks set annually (Robertson 1995). In the US between 1991 and 1995, the Western Pacific pelagic longline fleet experienced a period of rapid growth, while fishing effort declined in the majority of US fisheries (NMFS 1995). The expansion of the entire longline fleet is expected to continue as driftnetters shift to alternative fishing methods and as developing countries search for new economic opportunities (S. Bartle, pers. comm.). Growth in longline fishing effort reinforces the importance of modifying longlining practices as a matter of urgency, to render them less destructive to seabirds.

Conservation Measures

Measures to substantially reduce seabird by-catch without compromising, and in some cases actually increasing, fishing efficiency have been developed. When strictly implemented, the measures are effective because they reduce seabird-vessel interactions and increase the sink rate of bait. Some fishermen are researching and developing new methods. The following measures include some of the most effective available methods:

Streamer Lines: Setting a streamer line 150 meters long from a pole at the stern of the vessel makes it difficult for birds to seize baits. Several studies of the effectiveness of a streamer line demonstrate its capacity to reduce seabird by-catch by 60-88% (Brothers 1991, Anon. 1991, CCAMLR 1994a). Streamer lines could prevent the deaths of tens of thousands of seabirds and save the longline industry millions of dollars every year (Brothers 1991). Streamer lines are inexpensive and easy to use (Brothers 1995).

Night Setting: Restricting the setting of lines to nighttime, beginning one hour after sunset and ending at least three hours

before dawn whenever possible, can reduce seabird by-catch by 58-100% (Murray et al. 1993, CCAMLR 1994a). Also, minimizing deck lighting to that which is necessary for the safety of the crew helps reduce seabird by-catch. Most seabird by-catch occurs during day time line setting (Robertson 1995, Brothers 1995). Many seabirds, including albatrosses, feed by day and rest at night (Murray et al. 1993), needing light to visually locate prey (Brothers et al. 1995). Night setting should be used in combination with other measures in order to avoid the capture of night feeding seabirds, such as petrels, and to offset the higher incidence of seabird deaths on full or near-full moon nights. Furthermore, the impacts of night setting on sharks, sea turtles and other species should be investigated to ensure that new problems are not created.

Weighted Lines: Adding weights to branch lines as close to the hook as possible increases the sink rate of bait, thereby reducing bait loss to seabirds (Brothers 1991, Murray et al. 1993, CCAMLR 1994a, Brothers et al. 1995).

Underwater Setting: Adapting longline vessels for underwater setting has potential to eliminate seabird by-catch altogether. Casting lines out from under the stern at about two meters below the sea's surface reduces bait accessibility to scavenging seabirds (CCAMLR 1995a, CCAMLR 1994b). This option, however, needs to be more thoroughly researched, especially in light of its expense.

Thawed Bait: Using only thawed bait and baits with deflated swim bladders increases the sink rate of bait. Thus, the period during which baits are accessible to seabirds on the water's surface is reduced (Brothers 1995, CCAMLR 1994a, Brothers et al. 1995). Frozen bait and baits with air-filled swim bladders tend to float.

Bait Casting Practices: During line setting, there are two ways to throw the bait out of the turbulence of the ship's wake and propeller in order to increase its sink rate: fishermen can use an automatic bait throwing machine or they can educate their crew to throw the baited lines at least 10 meters clear of the ship (Brothers 1993, Brothers 1996, CCAMLR 1994a). Automatic bait throwing machines are capable of reducing seabird by-catch by 90% if used in conjunction with streamer lines (Anon. 1991).

Alternative Waste Disposal Practices: Avoiding the disposal of fish and bait waste during setting and hauling lessens

the incentive for birds to follow fishing vessels in search of food (Brothers 1991, Murray et al. 1993, Brothers 1995, CCAMLR 1994a, CCAMLR 1995b). Fishermen can dispose of waste at port, or dump at sea in frozen blocks or in a homogenized state.

Care For Live Birds Caught During Hauling: Acting quickly and carefully to bring aboard seabirds which are captured alive and removing hooks before releasing the birds are important practices. Embedded hooks can cause infection and ultimately death, and they can be passed on from parents to chicks during feeding (Brothers 1996, CCAMLR 1994a).

Fishing Away From Bird Breeding Grounds: For vulnerable populations, reducing or eliminating fishing effort near breeding areas should be considered.

Conclusion

While many seabirds are legally protected on land, they are not sufficiently protected at sea, even though they spend a large proportion of their lives at sea. The chances that seabirds will encounter longline vessels during their lifetimes are very high considering the many countries involved in longlining (e.g., Argentina, Australia, Brazil, Chile, Japan, New Zealand, Norway, Panama, South Africa, South Korea, Spain, Taiwan, USA) and the large ranges of seabirds on the open ocean.

Although various international treaties could be applied to seabird by-catch reduction efforts, action by CCAMLR represented the first solid step toward improving the sustainability of longline fishing (CCAMLR 1994a, 1994b, 1995a, 1995b and OES 1995). Building on this momentum, on 22 October 1996, the International Union for the Conservation of Nature (IUCN) adopted a Resolution on the "Incidental Mortality of Seabirds in Longline Fishing." Among other clauses, the Resolution called for "the IUCN, its members, all States, and regional fisheries institutions to reduce incidental seabird mortality within longline fisheries to insignificant levels for affected species." The Resolution was supported by all governments present (about 75), with the exception of Japan and Panama, and over 450 non-governmental organizations. This IUCN Resolution is without regulatory authority or any force of law; however, IUCN is probably the world's most prestigious conservation union, bringing together governments and environmental

interests to address international conservation issues. Thus, the Resolution is likely to be persuasive to those institutions that do have legal authority. Further action will clearly need to be taken on the regional, national and local levels, both by government agencies and by fishermen, to fully implement the goals set out in the Resolution and to put an end to this needless destruction of seabirds.

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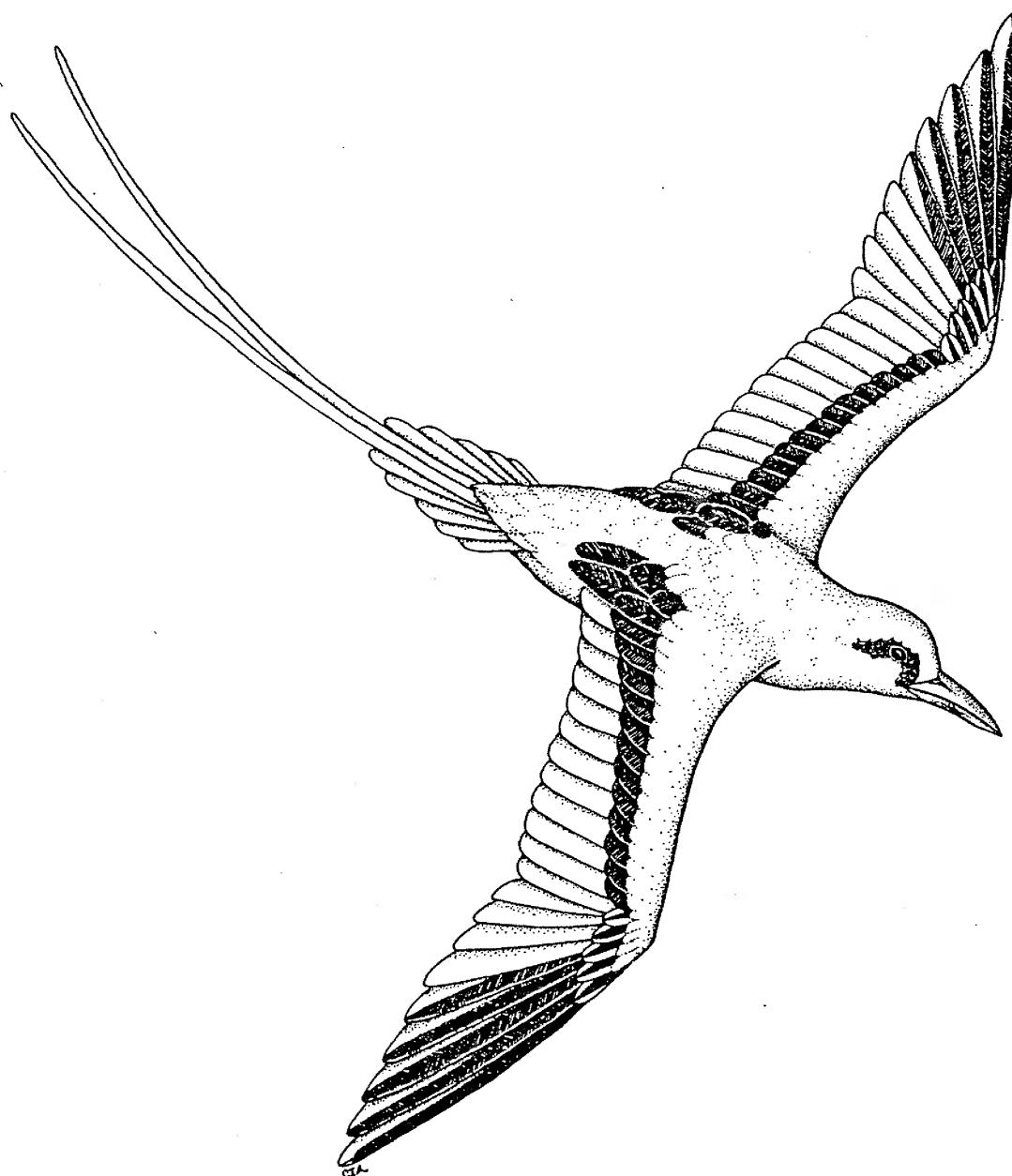
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ARTICLES

Influence Of Nesting Habitat In The Western/Glaucous-Winged Gull Hybrid Zone: A Preliminary Study by Thomas P. Good, Raymond J. Pierotti and Julie C. Ellis

The large, white-headed gulls of the genus *Larus* have a northern circumpolar distribution, and often hybridize in areas where they come into contact. Over 50% of 42 recognized species of *Larus* are known to hybridize (Pierotti 1987a), and at least two taxa are thought to be of hybrid origin (Panov 1989). The Glaucous-winged Gull *Larus glaucescens* breeds in North America from the Aleutian Islands in Alaska southward along coastal British Columbia and Washington to Oregon (Bell 1992). In regions of breeding sympatry, *L. glaucescens* interbreeds with Glaucous Gulls *Larus hyperboreus* in the Bering Sea (Strang 1977) and Herring Gulls *Larus argentatus* in southeastern Alaska (Patten 1980). The largest region of overlap and hybridization is with the Western Gull *Larus occidentalis* from northern Puget Sound in Washington to the central Oregon coast (Bell 1996).

Hoffman et al. (1978) identified pairs on Destruction Island, Washington as "pure" or "hybrid" and reported apparent assortative mating. Hybrid pairs at that colony showed higher hatching success than did pairs of *L. occidentalis* or *L. glaucescens*. Subsequent work at several sites found egg volume and clutch size of hybrids intermediate between *L. occidentalis* and *L. glaucescens* pairs, suggesting a complex, dynamic situation (Bell 1992).

The ecological and behavioral processes maintaining this hybrid zone have yet to be understood. The breeding ecology of pairs with one or more hybrids may be like that of either parental taxon, or it may be unique to hybrids. Breeding success in gulls can be influenced by nesting habitat selection and territory quality (Pierotti 1982, Pierotti 1987b) and parental attendance (Pierotti 1981, 1987b, Morris 1987). As part of a larger study to test competing hypotheses of hybrid zone maintenance, we tested hypotheses that 1) nest-site characteristics vary among habitats and 2) breeding success varies among habitats for breeding pairs at colonies within the hybrid zone.

Methods

The study was conducted on four is-

lands in Gray's Harbor, along the southern coast of Washington, at the approximate mid-point of the *L. glaucescens/L. occidentalis* hybrid zone. Sand Island (46°57'45"N, 124°03'25"W), Goose Island (46°58'40"N, 124°04'10"W) and an unnamed island (46°57'30"N, 124°03'05"W) are islands located in the northern bay, and Whitcomb Flats (46°54'40"N, 124°04'40"W) is an island located in the southern bay. Sand Island, Goose Island and Whitcomb Flats, in addition to the focal species, have had breeding populations of Ring-billed Gulls *Larus delawarensis*, Double-crested Cormorants *Phalacrocorax auritus* and Caspian Terns *Sterna caspia* (Speich and Wahl 1989). The islands range from sandbars with drift logs and sparse vegetation (American Sea-rocket *Cakile edentula* and Seabeach Sandwort *Honkenya peploides*) to islands with large, dense patches of dunegrass *Elymus mollis* and beachgrass *Ammophila arenaria* punctuated by Pacific Willow *Salix lucida* and stands of the reed *Phragmites australis*. Herbaceous species grow interspersed with the grasses, reflecting seaside plant communities of the nearby mainland.

During egg-laying in May 1995, we marked and numbered 432 nests on the four colonies by attaching flagging to vegetation or driftwood stuck in the sand or writing directly on drift logs adjacent to nests. For each nest, we categorized 1) nesting habitat as sand, grass or reed, 2) its colony position as center or edge, and 3) the natural screen adjacent to the nest (wood, grass, reed). We measured the angular extent (0-360°) of natural screens and the distance and compass direction to the nearest neighbor. Nearest neighbor distances were reciprocally-transformed and angular extent of screens were square-root transformed to achieve homogeneous variances prior to analyses of variance.

We calculated indices of breeding success, including clutch size, hatching number, hatching rate (hatchlings/egg), chick survival to two weeks, fledging number, fledging rate (fledglings/egg) and egg loss, from data collected during twice-weekly visits to each island. At each nest-

check, we marked new eggs and measured their length, breadth and mass. We weighed chicks and banded chicks with celluloid bands and United States Fish and Wildlife Service aluminum bands at weights above 100g. We performed nest checks until chicks fledged in August. Hatching rate, chick survival to two weeks, and fledging rate were arcsine-transformed to achieve homogeneous variances prior to analyses of variance.

Results

Of 325 active nests (those with at least one egg) on the four colonies, 179 were in "sand", 110 were in "grass" (primarily dunegrass, beachgrass, sedges *Carex* spp. and the herb *Potentilla anserina*) and 36 nests were in reed habitat (*Phragmites australis*). Nest microhabitat measurements varied among the three habitats. The mean angular extent (ñ1se) of natural screens adjacent to nests was greater in reeds (275 ñ12°) and grass (236 ñ9°) than in sand (26 ñ4°) ($F_2, 322=99.5, p<0.001$; Tukey HSD $p<0.05$). The percent of natural screens which blocked the nearest neighbor was greater in reeds (88%) and grass (80%) than in sand (13%) ($2=223, df=2, p<0.001$). Nesting density varied among habitats; nearest neighbor distances (ñ1se) were significantly lower in reeds (3.9 ñ0.2m) and grass (3.9 ñ0.3m) than in sand (6.2 ñ0.4) ($F_2, 322=5.5, p=0.005$; Tukey HSD $p<0.05$).

Breeding success at these colonies was extremely low overall and was strongly influenced by nesting habitat. The proportion of large clutch sizes was greatest in reeds; one-egg clutches were most common at nests in sand habitat and two and three egg clutches were more common at nests in grass and reed habitats ($2=60.5, df=4, p<0.01$; Figure 1). Hatching rate was greatest in reed habitat and lowest in sand habitat ($F_2, 322=19.6, p<0.001$). Chick survival rate to two weeks was greater in reed and grass habitats than in sand habitat ($F_2, 322=16.6, p<0.001$). Fledging rate was greater in reed and grass habitats than in sand habitat ($F_2, 311=24.4, p<0.001$) (Figure 2).

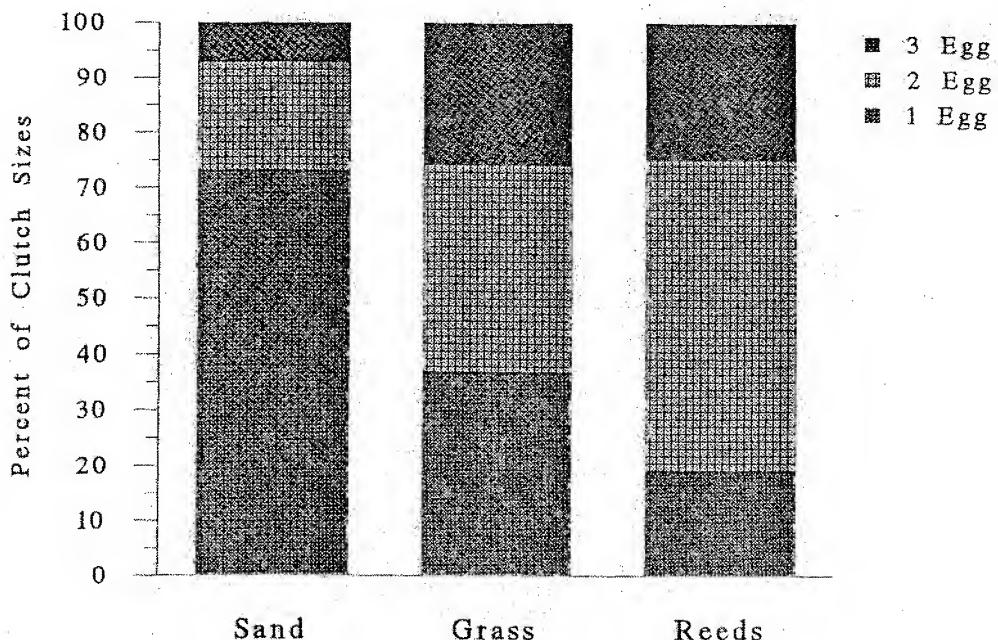


Figure 1. The distribution of clutch sizes in sand, grass and reed habitats on islands in Grays Harbor, Washington.

Discussion

Nest-site characteristics and measures of breeding success varied significantly among nesting habitats at these colonies. Nests in reed and grass habitat are closely spaced and surrounded by structure which is more likely to separate nearest neighbors. This can reduce aggression among neighbors (Cezilly and Quenette 1988) and enable pairs to nest more densely (Davis and Dunn 1976, Vermeer et al. 1988, Bukacinska and Bukacinski 1993, but see Murphy et al. 1984). Natural screens other than vegetation can act as visual or physical barriers; the heterogeneity of rocky habitats enables Herring Gulls to nest more densely (Pierotti 1982, 1987b), especially when avoiding nesting adjacent to the larger and more aggressive Great Black-backed Gull *Larus marinus* (Good ms). Group defense is enhanced by breeding colonially, however predation on eggs and chicks, especially by conspecifics, may be facilitated by dense nesting (Hunt and Hunt 1976, Pierotti 1982, 1987b, Vermeer et al. 1988, Spear and Anderson 1989, Good ms).

In Grays Harbor, large drift logs and other flotsam serve as screens for gulls in sand habitat. However, the quality of territories in sand habitat in terms of screen extent and direction relative to neighbors appeared to be lower. As avian predators are the main predators, structure above the

nests may be critical. Territories in sand habitat also tend to be larger, requiring more time spent on defense (Ewald et al. 1980).

Breeding success varied among habitats (see Fig. 2), however chick survival rates were less variable and were a consequence of egg survival rates. Pairs that defended eggs to hatching generally defended chicks to fledging regardless of habitat. Egg and chick mortality vary among habitats in gulls (Burger 1974, Pierotti 1982, 1987b), often directly related to extent or distribution of vegetation (Burger 1974, Jehl and Chase 1987). Rates of egg loss were extremely high at nests in sand habitat, where neighbor interactions and aggression were highest and nest attendance lowest. In the reeds, pairs that nested down tunnels lost few eggs. Pairs spent almost no time interacting with neighbors and a great deal of time loafing nearby in adjacent clearings. Pairs in reed habitat also initiated breeding earlier than in grass or sand habitats, which may contribute to greater nest success.

Predation by congeners was the primary cause of egg loss. While few gulls were egg specialists, occasional predation was widespread. Bald Eagles *Haliaeetus leucocephalus* are opportunistic predators on gull eggs, chicks and adults. We found evidence of eagle predation more often in sand and grass habitats than in reed habi-

tat. Eagles affected breeding success indirectly; adult gulls fly up off nests en masse in response to eagles ("dreads"), creating opportunities for egg predation by gulls. Eagle abundance on the islands varied considerably.

We regularly recorded up to 10 eagle observations/day, and we observed dreads several times daily. On May 23, we simultaneously observed 2 adults and 5 juveniles on Sand Island and 2 adults and 7 juveniles on "No Name" Island. Egg loss due to eagle presence devastates breeding murres *Uria aalge* on Tatoosh Island, Washington (Parrish 1995) and cormorants *Phalacrocorax auritus* and *P. pelagicus* on Mandarte Island, British Columbia (Verbeek 1982) by creating predation opportunities for gulls and Northwestern Crows *Corvus caurinus*.

Gull breeding success due to egg loss in Gray's Harbor (0.03 chicks fledged/egg) was lower than the lowest breeding success reported for *L. glaucescens* (0.10; Murphy et al. 1984) or *L. occidentalis* at the Farallon Islands, California (0.25 in the El Nino year of 1983; Penniman et al. 1990). On these islands, selecting habitats that minimize egg predation undoubtedly increases annual and lifetime breeding success.

This hybrid zone appears to be stable (Bell 1992). Future research will determine if this is due to hybrid inferiority balanced by gene flow (dynamic equilibrium), or if hybrids which may be maladapted in the parental communities may be relatively well-adapted in the area of mixed ecology (geographically bounded superiority) (Moore 1977). We will test the above hypotheses by comparing patterns of habitat choice, diet, mate and chick feeding regimes, incubation and brooding attention and territory and chick guarding among breeding pairs (*L. occidentalis*, / *L. glaucescens*, hybrids and combinations thereof). Gray's Harbor may be unique; half of the breeding individuals are hybrids (phenotypically intermediate). Additional study sites in the hybrid zone (Destruction, Tatoosh and Protection Islands, WA) will be investigated to test the importance of habitat selection and proportion of hybrid phe-

ntotypes over a greater geographic scale.

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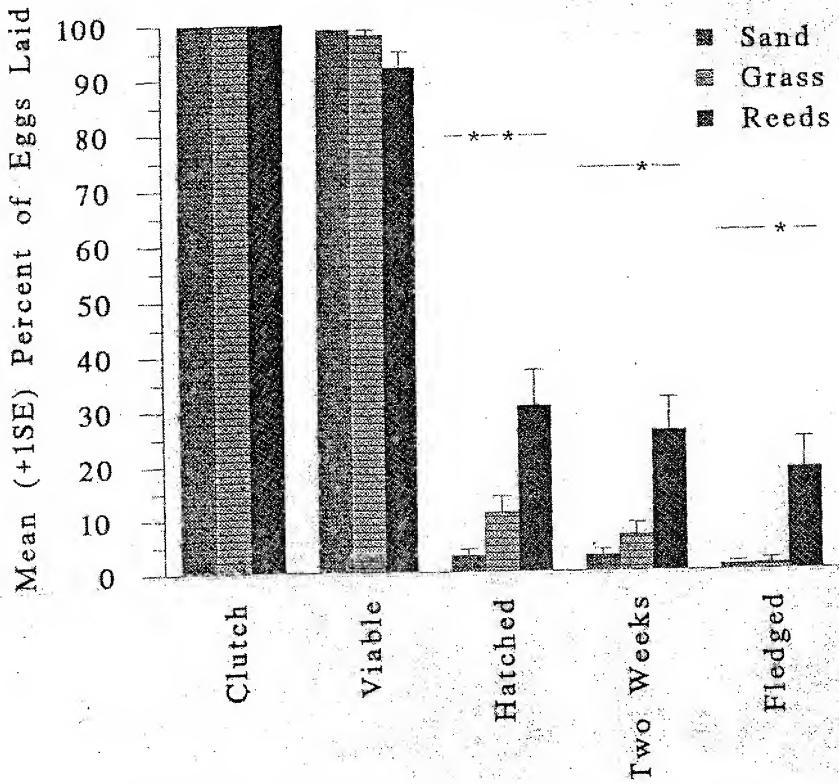


Figure 2. Breeding success of gulls as a percent of eggs laid in sand, grass and reed habitats on islands in Grays Harbor, Washington. "Viable" includes all but addled eggs. Error bars represent 1SE. (*=p<0.05 by Turkey HSD test)

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Scavenging Behavior Of The Waved Albatross In Galapagos: A Potential Problem With Increasing Long-Lining? by Godfrey Merlen

In 1994, the population of Waved Albatross *Diomedea irrorata* was estimated at 15,000 breeding pairs (Anderson 1995a). Well over 99% of their breeding activity is confined to Espanola Island in the Galapagos Archipelago. By attaching satellite transmitters to breeding birds during the incubation period, Anderson (1995b) was able to show that his sample ($n=5$) foraged over the continental shelf off Peru. However, the present report of a census carried out later in the same year shows that scavenging near the Galapagos Archipelago may also be an important part of Waved Albatross feeding. The proposed introduction of new fishing techniques (longlining and squid fishing) near the islands could result in a new conservation problem in an already beleaguered archipelago.

An unpublished report by the author on the occurrence and feeding activities of the Waved Albatross suggested that the birds are, to a greater or lesser extent, scavengers when in the waters near the archipelago during the breeding season. An excellent opportunity to further these observations on the distribution and scavenging behavior of Waved Albatross came when the author was asked by David Parer and Elizabeth Parer-Cook, of the Australian Broadcasting Corporation, to accompany them on a reconnaissance trip to the western part of the archipelago, aboard the motor yacht *Samba* between 1 and 14 September 1995 (Figure 1). We maintained a dawn-to-dusk survey on nine full days. On the other days, the *Samba* was anchored or made short journeys. Observations were made on these short trips also. The survey was carried out mainly by two observers (G. Merlen and D. Day), using 8x binoculars, but additional help was provided by the crew of the *Samba*, Naturalist Guide M. Garcia, and by D. Parer and E. Parer-Cook. There was an excellent observation platform in the form of the flying bridge 3.5m above sea level.

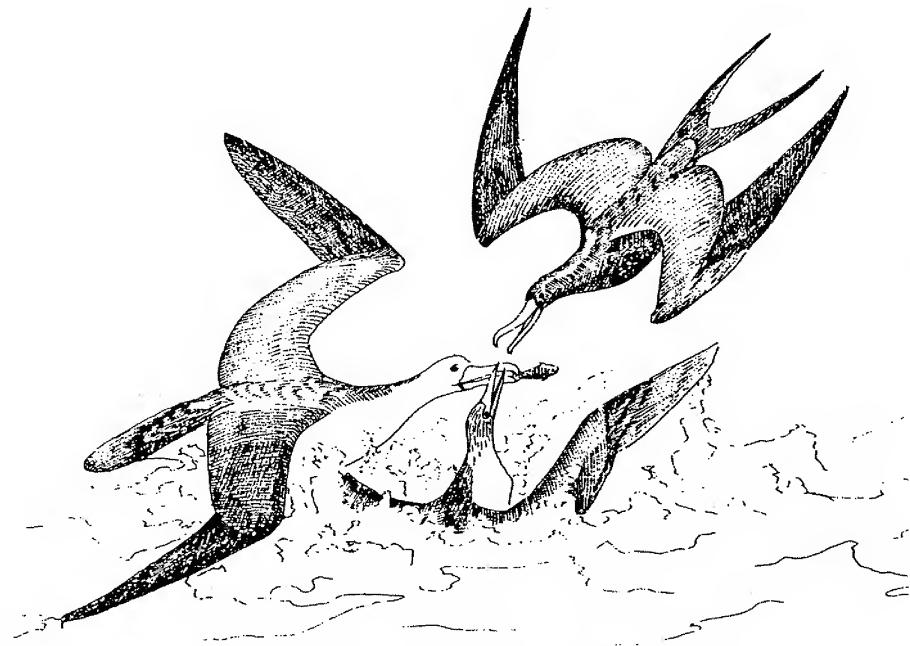
During the mostly calm weather, the distinctive white heads and necks of the Waved Albatross facilitated observation on the sea. Higher winds caused the birds to soar above the horizon, which also aided the count in more adverse conditions. We avoided counting birds twice by only searching ahead of the boat. At any time that the boat stopped, circled, or

made other maneuvers, the census was ended.

Where large concentrations of albatross were encountered, several counts were made by independent observers. After leaving such an area, no counts were made for half an hour. The average speed of travel was 8 knots and all positions were plotted by GPS.

which include tunas, sardines, jacks and sharks (pers. obs.).

The development of a feeding frenzy seemed a fixed pattern. Dolphins found the food and Blue-footed Boobies following overhead. Once the food was accessible to the birds, they began to dive on it. Frigatebirds, which had kept up, often at considerable height, then descended to



Albatross in flight were usually alone, although a few to many were often in the same area. On the water small groups (1-3) were common.

By far the greatest concentrations were found where Blue-footed Boobies *Sula nebouxii* were or had recently been feeding. On one occasion, 389 albatross were closely associated with several other species in a feeding frenzy. Such activities were frequent offshore in deep water, when Magnificent Frigatebirds *Fregata magnificens*, Common Dolphins *Delphinus delphis*, Blue-footed Boobies, Masked Boobies *Sula dactylatra*, Waved Albatross, White-vented Storm-Petrels *Oceanites gracilis*, Wedge-rumped Storm-Petrels *Oceanodroma tethys*, and Galapagos Sea Lions *Zalophus californianus* were present. Inshore (in shallower water or between the central islands) Bottle-nose Dolphins *Tursiops truncatus* may replace Common Dolphins. Feeding frenzies are associated with concentrations of fish,

mob the boobies, causing them to disgorge their recently gathered fish; if this occurred, the fish was eaten by the Frigatebirds. Albatross, which were present in these associations, also tried to take advantage of the melee by moving in and grabbing at the disgorged food. This was observed on dozens of occasions. We saw up to four albatross around one "downed" booby. Albatross did not seem to mob the boobies initially, but appeared to depend on the aggression and flying ability of the Frigatebirds. Storm-Petrels picked up whatever morsels were left over.

These feeding activities were highly dynamic and moved over the ocean at speeds of up to 3-4 knots. Some lasted for hours, but many broke up after 20 minutes or so. Prediction of such events is extremely difficult, as the productivity of the region is controlled by upwellings and fronts between water masses, which are unpredictable and unstable in themselves. On two consecutive days we found boo-

bies and albatross in the same area to the south of Cape Hammond (southwest Fernandina). However, the great concentration along the equator was ephemeral and not repeated over three further days of observation. Perhaps it was due to changes in oceanic conditions or perhaps it was because on the first day (7th September) we witnessed an attack (0° 09.4'N 91° 44.0'W) by 7 Orcas *Orcinus orca* on the feeding Common Dolphins. They killed at least one dolphin, and the small pieces that remained were scavenged by storm-petrels, frigatebirds and albatross. Albatross also scavenged a large dead squid (0° 19.9'S 91° 43.4'W), later identified as *Angistrocheirus lesevri*. Large concentrations of albatross were always associated with these feeding frenzies.

During the 24 days of observations (the cumulative time of the two reports), not a single albatross was seen feeding on live prey. Harris (1973) reported that the main food of breeding Waved Albatross was fish and squid. Since Blue-footed Boobies do not eat squid, the albatross must gather this themselves or gather it from other birds that frigatebirds attack such as Swallow-Tailed Gulls *Creagrus furcatus*. Some of the fish (Clupeids) found in albatross stomach contents in Harris's study could have been scavenged. Harris (1973) observed the interaction of albatross with boobies and felt that this behavior did not contribute greatly to their diet. However, the frequency with which we observed this albatross behavior leads me to believe that at least at times, or at certain stages of life, it may be important.

When concentrated feeding by boobies and dolphins began, it seemed to act as a signal, sucking in other birds, including albatross, from a great distance. The spacing of the birds over the ocean seemed such that the individuals were in sight of their neighbors at any particular moment, although not necessarily in direct sight of all the birds in the area. The movement of those nearer the fray may have caused others, further away and not in sight of the feeding activity, to move in the same direction.

This process sometimes continued until very large numbers of boobies were present (>1000), although often the process broke up before such large accumulations gathered. Thus, although many solitary boobies and albatross were seen, spaced over a huge area of ocean, it was highly probable that they were capable of

quickly joining various concentrated feeding groups. This system could be important, as it would allow a population of boobies to survey the ocean and quickly take advantage of any feeding opportunity that occurred. The albatross, clued in to the reaction of the boobies or using their own eyesight, could take advantage of this system, allowing them to scavenge more efficiently in areas where food was more abundant.

Masked Boobies *Sula dactylatra*, the other common diving sea bird near the islands, were not a major feature of the feeding activity and they never represented more than 5% of the boobies feeding. The figure was often as low as 2%.

It is not easy to ascertain the exact relationship of the organisms involved in feeding frenzies, because, in the Galapagos, Common Dolphins are very nervous of the close approach of vessels. This may be due to the presence of purse seine tuna boats, which often set their nets on the dolphins, because tunas associate with them. Or perhaps any strange noise alarms them since their predator, the orca, is present year round.

It seems that the Waved Albatross is, at least at some times a scavenger. From the duration of the observations and their limitation to daylight, it is not possible to say how important this method of feeding is, nor is it possible to state the importance of feeding frenzies, even though this feeding technique is extremely common. Should it be important, then the availability of food to scavenge has to be maintained. This, in turn, means that the structure of feeding frenzies and the well being of all their components (fish, dolphins, boobies, frigatebirds) may be of importance to the feeding, and, ultimately, to the breeding success of Waved Albatross. In this uncertain situation, it is vital to maintain the viability of this pelagic trophic system that is found in the western part of the Galapagos Archipelago.

One of the reasons that the marine environment has remained relatively untouched until the last few years is that the fishing fleet has been slow, local, and primitive in the techniques used. At present (1996), there is enormous pressure to allow local fishermen to increase the tonnage of their fleet. This is in part because of the lure of anticipated riches in the ocean in the form of migratory fish, but also because the conservation of coastal marine resources requires reduced fishing pressure near the shoreline. A large in-

crease in the fleet could have serious and unforeseen consequences for the marine environment, especially if strong measures are not taken to control fishing activities.

One of the "new" techniques to be introduced is the use of longlines to harvest the valuable Yellow Fin Tuna *Thunnus albacares* and other pelagic fish in the waters surrounding the archipelago. As it is, longliners are already arriving from the mainland of Ecuador. The effects of longlining on albatross in other parts of the world has been catastrophic (e.g., de la Mare and Kerry 1994, Gales 1993.). Albatross scavenge from the baited hooks as they enter the water. It is not known whether Waved Albatross will adopt the same habit once this food source becomes available to them. However, with the knowledge that the birds are not only scavengers, but also feed largely on squid (Harris 1973), which is a popular bait for longlining, it is inadvisable to ignore the effects that may result from opening a fishery without further studies. In order to protect the assemblage of animals that may help to ensure the future of the endemic Waved Albatross, an overall protection should be given to the waters within the Marine Resource Reserve (15 nautical miles seaward from the perimeter of the Archipelago) by prohibiting potentially dangerous fishing techniques within this area. This is not only for the protection of single species, but for the well being of the ecosystem.

I would like to thank David Parer and Elizabeth Parer-Cook for giving me the opportunity to travel with them. Also to the crew of the *Samba* for the use of their keen eyes and especially to David Day. My appreciation is also extended to Dr. Mike Harris and Dr. Sarah Wanless for their help in preparing this manuscript.

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Godfrey Merlen, Puerto Ayora, Galapagos. 11 September 1996

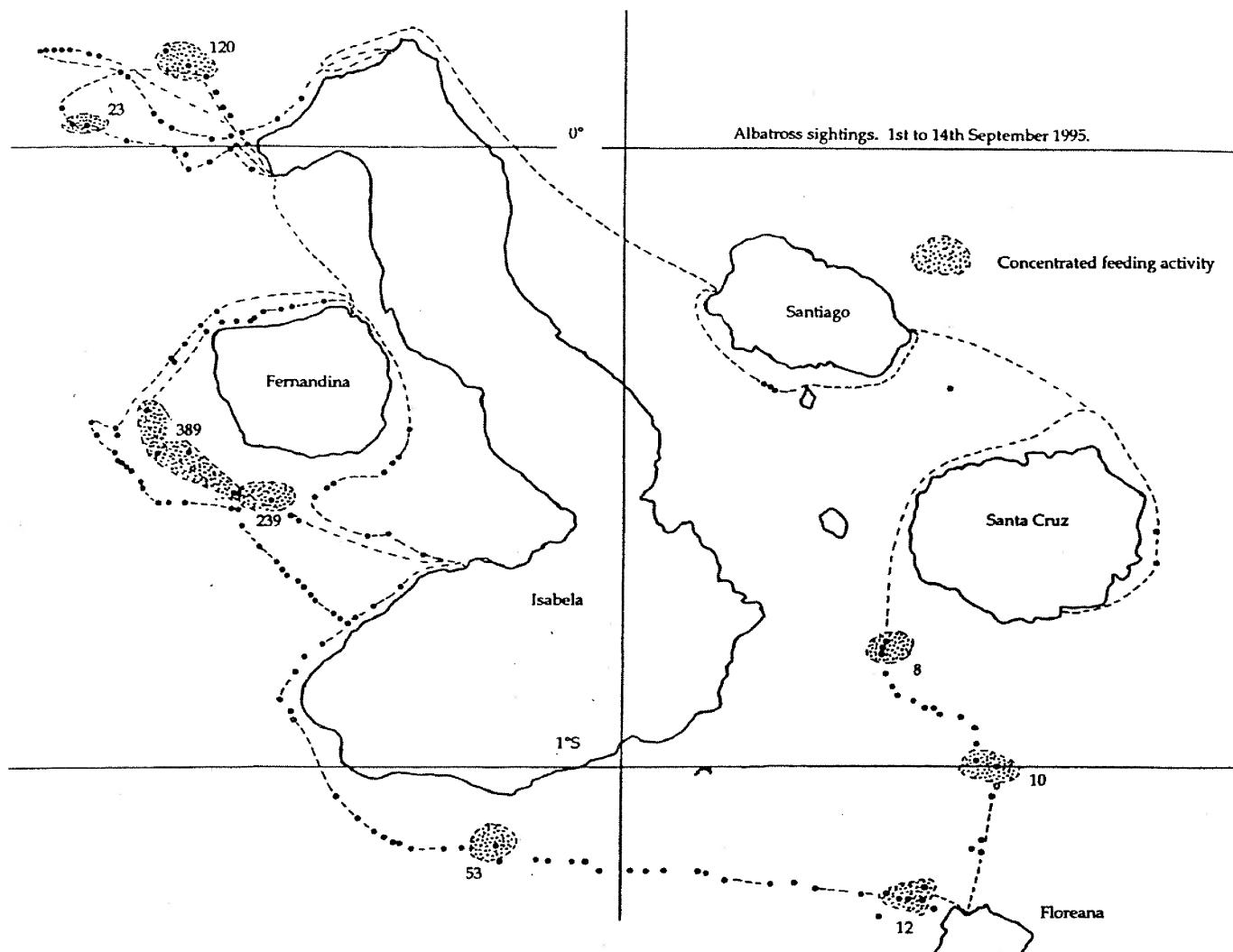


Figure 1. Survey route of the yacht *Samba* in the western part of the Galapagos Archipelago 1-14 September 1995. Locations of observations of Waved Albatross and of feeding concentrations are shown on survey route track.

PSG NEWS

SEABIRD CONSERVATION

The Pacific Seabird Group worked on a wide variety of seabird conservation issues during the past 18 months. Members who have information about issues that may benefit from PSG involvement or who wish to review documents and to assist the Conservation Committee in drafting PSG letters should contact me.

Exxon Valdez Oil Spill (EVOS) Restoration

PSG's Seabird Restoration Workshop, funded by the *Exxon Valdez* Oil Spill Trustee Council, focused on the science of seabird restoration and was a great success. An international group of more than 40 biologists, including scientists from Great Britain, Belgium, France, New Zealand, Japan and Canada, met in autumn 1995 in Alaska. During the past year, the Restoration Committee and the Conservation Committee have been drafting a report to summarize practical advice and recommendations to guide the EVOS and other trustee councils on how best to restore seabirds injured by oil spills. We hope to release a final report in early 1997.

During the past five years, PSG has sent 15 letters commenting on restoration plans and annual work plans that the EVOS trustee council prepared. PSG's comments on the 1996 annual work plan focused on the need to provide more funding for Marbled Murrelet work, and this effort was successful. Our comments in 1995 supported projects for predator control on Seaguan Island, investigations on the status of Kittlitz' Murrelets, and studies of the relationship between seabird populations and forage fish.

In 1995, the EVOS trustee council began a wholesale reappraisal of the list of injured seabirds. For several years, the trustee council had spent seabird restoration funds exclusively on Common Murres, Harlequin Ducks, Marbled Murrelets and Pigeon Guillemots. PSG's comments in 1993, 1994 and 1995 objected to this approach because it ignored the damage done to other seabirds. The EVOS Trustee Council has recently added Kittlitz's

Murrelets, four species of loons and three species of cormorants to the list of injured seabirds. We congratulate the trustee council and its staff for making this mid-course correction, and acknowledge that few public officials revisit their past decisions.

Endangered Species

The U.S. Fish & Wildlife Service (FWS) began steps to list the Short-tailed Albatross in U.S. waters when it placed this species on its candidate list in August. Curiously, current federal regulations list it as endangered "worldwide except USA." Gerald Winegrad of the American Bird Conservancy (ABC) has been instrumental in persuading FWS to assign the listing process to the Alaska regional office instead of Portland, which should expedite the listing. PSG has worked with ABC and the Environmental Defense Fund to insure that FWS does not revise the incidental take permit for the long-line fishery to allow a take of more than the current two Short-tailed Albatrosses per year.

FWS remains undecided whether to list the Hawaii population of Harcourt's Storm-Petrel *Oceanodroma castro* endangered, although a petition was filed six years ago. FWS has conducted surveys of this species in Hawaii. Biologists found a few additional areas where birds can be found, and located more birds than the 1990 estimate of one hundred pairs (Harrison, Telfer and Sincock, 'Elepaio 50:47-51).

PSG's Executive Council in January 1994 directed the Xantus' Murrelet Technical Committee to prepare the necessary documentation to file a petition to declare the Xantus' Murrelet endangered or threatened. During spring 1994, PSG informed FWS and the California Department of Fish & Game that a petition may be filed, and held a meeting with biologists and agency staff to exchange information on the status of this species. PSG's efforts to list the Xantus' Murrelet have not moved forward because Interior has not provided PSG with its recent information on the status of this species. The Conservation Committee is considering filing a Freedom of Information Act request with Interior if the pertinent in-

formation is not made available soon.

Albatross By-Catch in Long-Line Fisheries

In mid-1995, PSG sent a series of Freedom of Information Act requests to the southwest regional office of National Marine Fisheries Service (NMFS) requesting government information regarding the by-catch of albatross in the bigeye tuna and broadbill swordfish longline fisheries that operate out of Hawaii. NMFS had refused to provide this data to FWS, and anecdotal information suggested there might be a conservation problem. We quickly received a substantial amount of information, and our preliminary review indicated that this fishery poses potentially serious problems for Black-footed and Laysan albatross. Apparently spurred (and perhaps embarrassed) by PSG's request to obtain scientific information, NMFS has recently analyzed its data and estimates that 3,000 albatross were killed in each of the last two years by the 120 boats in Hawaii's longline fleet.

Conservation Measures for Antarctic Fishing

In early 1996, PSG responded to a request for public comment from the Division of Polar Affairs, U.S. State Department published in the Federal Register. PSG expressed strong support of the fishery conservation measures that were agreed upon at the Fourteenth Meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Convention Area in Tasmania. We noted that the proposed measures are similar to those endorsed at the First International Conference on the Biology and Conservation of Albatrosses. PSG has long supported reasonable gear restrictions and area closures for long-line fisheries, including the closure of the waters adjacent to seabird colonies in Hawaii to long-line fisheries in 1991. Long-line fisheries can seriously harm seabird populations when seabirds are impaled on hooks and subsequently drown. Scientific reports indicate that tens of thousands of albatrosses and petrels are killed in the Antarctic, especially the southern Bluefin Tuna long-line fishery (see Fall 1995 Pa-

PSG NEWS

cific Seabirds, page 20). According to a 1993 study by Rosemary Gales, at least six albatross species have declined due to the long-line fisheries in this area.

PSG suggested that the measures be enforced by an observer program, and noted that many petrel species are nocturnal foragers that may die when nets are set at night. PSG also endorsed the concept of a protective limit on the catch of krill (*Euphausia superba*), and noted that human experience in virtually every marine fishery has been that catch limits are not considered or adopted until there has been a major crash in the fishery or major harm done to species depending on that resource.

The State Department adopted the proposed regulations and specifically discussed PSG's comments in the Federal Register notice that announced the final rule. This may be the first instance of PSG being mentioned in a Federal Register notice.

Proposed Pulu Keeling National Park, Australia

In late 1995, PSG wrote to the Australian Nature Conservation Agency in Canberra to support a proposed national park at North Keeling Island, in the Territory of the Cocos (Keeling) Islands. This spring, we received a reply from the Australian government indicating that the park has been established, and thanking PSG for its comments.

North Keeling is uninhabited and is the only island among the 27 Cocos Islands where seabirds still nest, including about 50,000 Red-footed Boobies, several thousand Greater and Lesser frigatebirds, as well as White Terns, Noddy Terns, Sooty Terns, Masked Boobies, Brown Boobies, White-tailed Tropicbirds, Red-tailed Tropicbirds and an endemic Buff Banded Rail. The Australian Nature Conservation Agency has been working with the Cocos Islanders to promote a conservation ethic, and may attempt to re-establish seabirds on the southern, inhabited islands.

Enforcement of Migratory Bird Treaty Act Offshore

In April 1996, PSG wrote to Secretary of the Interior Bruce Babbitt, Attorney General Janet Reno and Under Secretary of State Timothy Wirth to ask that the U.S. Department of the Interior enforce the Migratory Bird Treaty Act in the 200-mile Exclusive Economic Zone (EEZ).

Interior enforces this Act only to the 12-mile territorial sea, not the 200-mile EEZ. Interior's inactions are based upon several questionable Solicitor's opinions from the 1980s by Don Barry, a senior FWS official. When the Senate ratified the USA-Russia Migratory Bird Treaty in 1973, the negotiation report for the U.S. delegation stated it intended to apply the treaty to the high seas out to 200 miles.

Recently enforcement officers of FWS have been unable to prosecute intentional and wanton destruction of seabirds in the Bering Sea by U.S. fishermen because the activities took place beyond the 12-mile territorial sea. PSG has raised this issue every year since 1991, either to FWS or the Secretary of the Interior. In recent years, the American Ornithologists Union, National Audubon Society, World Wildlife Fund and American Bird Conservancy have joined PSG in urging FWS to extend jurisdiction over migratory birds throughout the EEZ. We may be making some progress. Apparently the Solicitor's Office in Interior now agrees that its legal opinions are wrong (even illegal), but has preferred to let them stand during this election year. Courage seems to be an endangered species within the Solicitor's Office.

American Bird Conservancy

Malcolm Coulter and I are PSG's delegates to the American Bird Conservancy, where we bring seabird issues to the attention of the broad ornithological conservation community through its Policy Council. Independently, I serve on ABC's board of directors and am Secretary to the board. Gerald Winegrad (202-467-8349) has served as ABC's director of government relations for almost a year. Gerald has done an outstanding job on many issues, including a seabird by-catch, banning pesticides that harm birds in Latin America, and predator control. Gerald arranged the attendance of Assistant Secretary of the Interior George Frampton at the April Policy Council meeting, and PSG chair Bill Everett used this opportunity to urge Frampton to do more fox control work on seabird colonies in Alaska.

Other Issues

Among the many other recent activities of the Conservation Committee are: Renominating Jim King to continue on the Public Advisory Group to the EVOS Trustee Council;

Writing a letter of support for moratorium of oil leasing in Lower Cook Inlet, which may have influenced the decision to postpone the lease sale; assisting Partners in Flight in setting conservation priorities for North American seabirds; and commenting on a draft eider management plan for the Circumpolar Seabird Group.

Craig S. Harrison, Vice Chair for Conservation

JAPAN SEABIRD CONSERVATION

The Pacific Seabird Group's Japan Seabird Conservation Committee (JSCC) together with the Japan Alcid Society (JAS) conducted a week long survey on the Shiretoko Peninsula and nearby Mt. Mokoto in Hokkaido, Japan this summer to look for evidence of breeding by the Asiatic Marbled Murrelet (*Brachyramphus marmoratus perdist*). Funding came from a grant from the Nature Conservation Society of Japan (NACS-J).

Up to now, the sole record of breeding in Japan has been a puzzling account from 1961 of an adult attending a ground nest in a grassy clearing on Mt. Mokoto in northeastern Hokkaido (the northernmost of the four main islands). The adult was killed and confirmed to be a Marbled Murrelet, however it appeared to have been attending a clutch of not one but three eggs. Not surprisingly, recent examination of the eggs has suggested that they were not Marbled Murrelet eggs at all. The PSG-JAS team, therefore, hoped to come back with clear evidence of breeding. An additional goal was to train people for future, more comprehensive surveys.

The researchers included, from North America, Kim Nelson, Tom Hamer, Lora Leschner, Anthony Gaston, Will Wright, and John Fries, and from Japan, Koji Ono, Yoshihiro Fukuda, Kuniko Otsuki, Takeo Akama, Mihoko Sato, Mitsuki Matsuda, and Yasuhiro Kawasaki. From June 30 to July 7, the team conducted vegetation surveys, early morning watches for fly-ins, and interviews with local researchers and park staff. No solid evidence of breeding was gotten this time. A more detailed description of the surveys will be included in the next issue of Pacific Seabirds, and a

complete report will be published by the JAS in late November.

The Marbled Murrelet surveys were part of the JAS's continuing study of the breeding status of Alcids in Japan begun last year. One product of this study has been the compilation of a catalogue of alcid breeding grounds in Japan. Although the current version is in Japanese, the JAS plans to publish future revised catalogues in English.

The JAS has also created a Japanese-language web page in order to promote public understanding of and support for seabird conservation efforts in Japan (<http://www2.gol.com/users/kojiono/>). It currently registers about 20 users per day, and many of these have become JAS members via the internet. A combined JSCC-JAS web page in English has been planned for the near future.

Evidence of the heightened interest in wildlife and conservation in Japan was clearly seen this year with the construction of the Haboro Seabird Information Center, the first of its kind in the country. Located in Haboro, Hokkaido, the mainland town in which Teuri Island (28 km offshore) is incorporated, it will serve as a center for public education, seabird research, and international scientific exchange in the field. The facility will also help promote ecotourism on Teuri Island which boasts eight breeding species of seabirds including Spectacled Guillemot and the largest colony of Rhinoceros Auks in the world. As seen from the observation platform in the middle of the colony, the spectacle of over a hundred thousand Rhino Auks hurtling in from the sea at sunset, bills laden with fish, and a force of thousands of Black-Tailed and Slaty-Backed Gulls engaged in aggressive kleptoparasitism dazzled those PSG members who attended the International Seabird Forum in Haboro this past summer. The center is scheduled to open next spring.

*Koji Ono and John Fries,
Chiba, Japan*

SEABIRD MONITORING

The rallying point of this Committee's work is the creation of a comprehensive database for time series data on Pacific seabird populations and reproductive pa-

rameters. The Committee has made significant strides toward realization of the Pacific Seabird Monitoring Database during the past year as a result of the dedicated efforts of many people. Through interagency agreements with various offices of the U.S. Fish and Wildlife Service and National Park Service, the National Biological Service (recently realigned as the Biological Resources Division of the U.S. Geological Survey) has funded the work required to collate, edit, and key-enter cumulative data from a number of important seabird monitoring projects in North America and the Hawaiian Islands. The NBS (BRD) has also entered into a cooperative agreement with PSG to manage contracts for data entry by non-governmental cooperators. At the present time, agency cooperators (and principal contacts) include the Alaska Maritime National Wildlife Refuge (Vernon Byrd), Alaska Peninsula National Wildlife Refuge (Donna Dewhurst), Togiak National Wildlife Refuge (Lisa Haggblom), Alaska Migratory Bird Management Office (David Irons), Oregon Coastal National Wildlife Refuges (Roy Lowe), Channel Islands National Park (Paige Martin), and the Hawaiian and Pacific Islands National Wildlife Refuges (Beth Flint). Through the PSG-BRD Cooperative Agreement, we are presently working with Point Reyes Bird Observatory (Bill Sydeman) and Simon Fraser University (Doug Bertram). I would also note that others, especially Tony Gaston (Queen Charlotte Islands) and Yutaka Watanuki (Teuri Island in northern Japan), have made significant contributions of data in the absence of any financial support.

I would especially like to acknowledge the heroic efforts of Charla Sterne, whom I was fortunate enough to employ a little over a year ago, and who has since been working full-time on this project. Most of our progress on the managerial and project development side this year is attributable to her. Charla has developed a PC-based data-entry application using Microsoft Access and extensive original documentation for its use. She distributes these products to cooperators and has established herself as a sort of single-handed support network. I personally do not see how the Committee could hope to achieve its ambitious goals without someone of Charla's capability and initiative dedicated to the task. As we move along, Charla increasingly will be able to focus

on development of software tools for query, analysis, and presentation of time series data.

This project is well-funded by the BRD again this fiscal year, and while the Seabird Monitoring Committee has previously identified some priorities for data entry, I encourage anyone with suitable monitoring data to contact me, Charla, or any Committee member regarding your need for support and proposed schedule for getting data into the system. We continue to offer protection against improper or preemptive use of your data by others. No data have yet been publicly released, and none will be until contributors are satisfied with policies the Committee is developing for ethical use of the database.

I believe I speak for all our current cooperators, as well as everyone on the Committee, in saying that the more involved one becomes in this project, the more one realizes how valuable and long-overdue the effort to collate seabird monitoring data on a large scale really is.

Scott A. Hatch

MARBLED MURRELET CONSERVATION

As your new Marbled Murrelet Technical Committee (MMTC) Technical Coordinator I would like to invite you to participate in the many activities and subcommittees that MMTC has organized. My goal is to facilitate communication between the various researchers and land managers involved in our activities, and promote participation by all groups and individuals in this process. Over the past six years the Pacific Seabird Group and the MMTC has been a leader in helping resolve difficult conservation issues associated with the Murrelet. I hope we can be just as active over the next two years. I would like to thank Nancy Naslund, our coordinator for the past two years, for her efforts and contributions to the MMTC.

Communications

Several letters regarding important conservation issues associated with the breeding habitat of the Marbled Murrelet were drafted and sent to appropriate agencies and individuals. These communications are summarized below.

3/13/96 - A letter was sent to Bill

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Clinton, (President of the United States), Kathleen McGinty (director of the President's Council on Environmental Quality), Dan Glickman (Secretary of the U.S. Dept. Of Agriculture), Bruce Babbitt (Secretary of the U.S. Dept. Of Interior), Jack Ward Thomas (Chief of the U.S. Forest Service), and Michael Spear (Director of the U.S. Fish and Wildlife Service) outlining the Executive Council's concern about the effects of the Federal Salvage legislation (HR 1944 [P.L. 104-19]) on the survival and recovery of the Marbled Murrelet. Because the legislation allowed the harvesting of green trees as well as other damaged trees it could have a significant impact on Marbled Murrelet populations. We indicated our support of attempts by the USFS to provide timber sale purchasers alternate timber volume located outside of these known breeding areas.

4/17/96 - A letter was sent to Jack Ward Thomas (Chief of the U.S. Forest Service) concerning the affects of the Federal Salvage Legislation on the survival and recovery of the Marbled Murrelet. We voiced our support of locating alternate timber volume outside of breeding areas and providing this volume to timber purchasers. We also made a request that any substitute volume be taken from areas that are unsuitable habitat for Marbled Murrelets, and to do so in a way that minimized the impacts to larger contiguous stands of suitable habitat.

4/23/96 - A letter updating several aspects of the Pacific Seabird Group Marbled Murrelet Survey Protocol was sent to all interested parties. The letter clarified some aspects of Murrelet behavior such as circling, talked about the annual variability in detecting birds, and reviewed several aspects of using tree climbing techniques to locate nest sites.

4/22/96 - Several members of the Pacific Seabird Group Executive Council and MMTC coordinators responded to a subpoena from the Scott Timber Company by providing documents related to MMTC activities over the last 10 years (1986-1996). These documents included communications, meeting agendas and notes, workshops or symposia agendas or notes, membership lists, names of committee coordinators, and back issues of the Pacific Seabird Group Bulletin. The subpoena was concerning a lawsuit filed by Scott against the U.S. Forest Service over some timber sale contracts.

7/15/96 - A letter was sent to Michael

Spear (Director of the USFWS) that provided information to assist land managers in making accurate habitat suitability assessments to determine whether a stand should be surveyed for Marbled Murrelets. Concern was expressed about the potential loss of occupied sites across the range of the Murrelet because of inaccurate habitat assessments. General recommendations were made about how to conduct these habitat assessments and we suggested that the MMTC may draft some guidelines outlining a standard methodology that could be used to help land managers make these determinations.

7/31/96 - A letter was sent to Ms. Molly McCammon (Executive Director of the Exxon Valdez Oil spill Trustee Council) approving the efforts to investigate forage fish within the spill zone and supporting funding of research on the Marbled Murrelet. Funding that had been provided to Murrelet research was in jeopardy for FY97.

8/14/96 - A letter was sent to Dan Glickman (Secretary of Agriculture) and Bruce Babbitt (Secretary of Interior) concerning the definition of "nesting" within the Federal Salvage Legislation. We supported the idea that occupied behaviors of Marbled Murrelets are strong indicators of actual nesting and that many occupied sites do not contain any known nests because of the difficulty of locating nests and lack of effort. We recommended that they classify occupied Marbled Murrelet stands as nesting areas.

Workshops

A workshop designed to examine the statistical aspects of surveying and sampling populations of Marbled Murrelets in the marine environment was sponsored by the Pacific Seabird Group, U.S. Fish and Wildlife Service, and USFS Redwood Sciences Laboratory. The Workshop was held on November 4-6th in Portland, Oregon and was attended by over 40 researchers and land managers. A standardized marine survey protocol for Marbled Murrelets is one product that may be produced by the workshop along with clarifications and guidance concerning the statistical and analytical methods that can be used to analyze marine survey data. A publication reviewing the presentations and results of the workshop may be published by the Pacific Seabird Group.

Protocols

A letter clarifying some aspects of the

PSG Marbled Murrelet Inland Survey Protocol was sent out by the editors of the protocol on 4/23/96.

A draft protocol outlining standard methods and approaches for gathering data on the forest structural characteristics of Marbled Murrelet habitat is planned to be available at the January 1996 meeting for review. The protocol is being drafted by Danielle Prenzlow, Thomas Hamer and Kim Nelson.

A marine survey protocol is being drafted by Sherri Miller and other subcommittee members to help marine researchers standardize marine survey methodologies for Marbled Murrelets.

International Conservation Activities

Several members of the Pacific Seabird Group (Kim Nelson; Thomas Hamer, John Fries, Will Wright, Laura Leschner, Tony Gaston) traveled to Japan in June to assist and train Japanese researchers of the Japanese Alcid Society in conducting inland surveys for the Long-Billed Murrelet (*Brachyrampus marmoratus perdist*) on the Island of Hokkaido. No birds were detected but surveys (and other research) will likely continue in 1997. These members also attended a seabird workshop in Haboro-Cho and visited a seabird research center on Teuri Island.

Marbled Murrelet Recovery Team - U.S.

The USFWS Marbled Murrelet Recovery Team met for three days in October of 1996 to put finishing touches on the final Marbled Murrelet recovery Plan.

The Draft Recovery Plan was developed over the last two years by the Recovery Team and Agency/State consultants appointed by the USFWS Regional Director. A final plan is expected to be completed this winter.

Tom Hamer

PACIFIC SEABIRD GROUP PUBLICATIONS

The Publications Committee general functions to support, encourage and provide guidance to publication projects. Other than Pacific Seabirds, PSG publications include Symposia and Technical Publications.

At present there are two Symposia in

preparation, one near submission for printing and the other in formation. The first, already seen as a symposium at the last annual meeting deals with the behavioral ecology of sea ducks and is being edited by Ian Goudie and Maraget Perersen. The topic of the second concerns, loosely, twenty-five years of change in marine bird populations and their environment, and is being organized by David Duffy for a symposium at the 25th annual meeting and eventual publication.

A draft manuscript, the *Exxon Valdez Oil Spill Seabird Restoration Workshop*, edited by Ken Warheit, Craig Harrison and George Divoky, has been submitted for publication as the first PSG Technical Publication. Other discussed potential Technical Publications include seabird catalogs for California, Oregon and Washington, catalogs of photographs of seabird colonies, regional marine bird faunal works, and marine bird databases.

The committee has discussed and is about to circulate draft guidelines, prepared by George Divoky, that set out the responsibilities and requirements for all steps from the inception to holding, and eventual publishing, of PSG Symposia.

There is agreement that the process leading to all PSG publications must include peer review and that all PSG protocols should thus appear as PSG Technical Publications.

The use of multimedia formats for publications is being discussed. Compact disks seem ideally suited for publishing catalogs of seabird colony photographs, seabird colony catalogs and databases. This format allows for easy application to web pages.

Steven M. Speich

PSG AWARDS - CALL FOR NOMINATIONS

Several years ago PSG instituted a series of awards to recognize the accomplishments of individuals who have made significant contributions to either conservation, science, or education regarding seabirds, or who have made an outstanding contribution to the success of the PSG. In order to provide structure to the process of selecting worthy individuals to receive awards, in Victoria the Executive Council created the Awards Committee, consisting

of the Chair-elect, the current Chair, and past Chair, to solicit and review nominations. The Past Chair coordinates this committee. The committee will make recommendations to the full Executive Council, who will in turn vote on awards to be presented at future meetings. There is no mandate to present these awards at every meeting.

The Awards Committee would like to receive nominations as appropriate, in two categories: Lifetime Achievement and Special Achievement. To nominate a candidate, please prepare and submit a brief statement of the individual's accomplishments and contributions to Mark Rauzon (see last page of this volume for address). If the nomination you submit is accepted, you should be prepared to conduct a short presentation on the individual at a PSG meeting, and write a summary for Pacific Seabirds. The deadline for submissions for awards to be presented at the 25th Annual PSG Meeting in January of 1998 is December 1996.

submitting items.

The editors of Pacific Seabirds are particularly interested in receiving short technical notes and longer review articles relating to seabirds and their environment. Submitted articles will be sent out for peer review before their potential acceptance for publication in Pacific Seabirds. Manuscripts may be submitted at any time.

PSG WEB SITE

Thanks to the coordinating efforts of Craig Harrison, and Robert B. Hole, Jr. of New Mexico State University, the Pacific Seabird Group now has a web site: <tp://www.nmnh.si.edu/BIRDNET/PacBir ds/>. Please visit the site and bring your comments and suggestions to the Executive Council meeting for discussion. The Publication Committee is looking for an individual who can take the responsibility for maintaining the site for the PSG.

TENYO MARU RESTORATION PLAN

The draft *Tenyu Maru* Oil Spill Restoration Plan will be completed in late fall of 1996 and will hopefully be available for public review in December 1996. The PSG Restoration Committee will meet in Portland during the annual PSG meeting in January and will discuss the restoration plan. Contact Ken Warheit for information on meeting time and place.

PACIFIC SEABIRDS SUBMISSION DEADLINE

The deadline for submitting materials to be included in the next issue of Pacific Seabirds is March 15, 1997. All material, except those relating to conservation issues, should be sent to The Editor. Conservation related material should be sent to the Vice-Chair for Conservation, the Associate Editor for Conservation. General news items of interest to the membership for placement in the Bulletin Board and PSG News are always welcome. Please contact the editors of Pacific Seabirds for formatting instructions prior to

EXECUTIVE COUNCIL MEETING OPEN TO MEMBERS

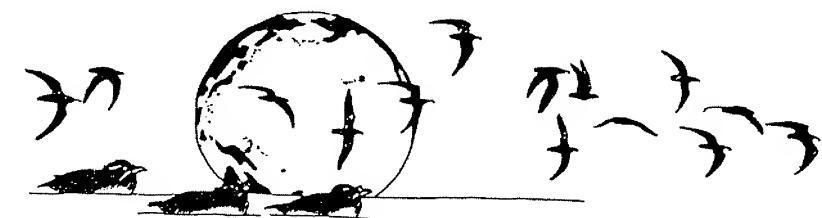
Everyone is welcome to participate in Executive Council meetings, which take place during our annual meeting (this year on January 8 from 13:00-17:00 and January 11 from 13:30-14:00). If you have a special interest in the workings of the PSG or wish to become a future member of the Executive Council we recommend you attend all Executive Council meetings.

CALL FOR EXECUTIVE COUNCIL NOMINATIONS

Nomination of potential candidates to serve on the PSG executive Council, starting after the 1988 annual meeting, are now being accepted by the Elections Committee. The availability and interest of potential nominees should be determined prior to their nomination. Contact the Elections Committee for details and list of positions that will be available.

1997 ANNUAL MEETING IN PORTLAND, OREGON

PACIFIC SEABIRD GROUP



**TWENTY-FOURTH ANNUAL MEETING
PORTLAND, OREGON
8-12 JANUARY 1997**

The 1997 Annual Meeting of the Pacific Seabird Group will be held at the Marriott Hotel in downtown Portland, the *Rose City*, from 8-12 January 1997. The meeting will include plenary and special paper sessions that focus on the health and ecology of the near-shore ecosystem (tentative title). A meeting announcement, with registration materials and a call for papers, will be mailed in early September 1996. Deadlines for abstracts and registration will be 1 October and 1 November 1996, respectively.

If you have any questions please contact:

Local Committee Chairs:

Dave Renwald, Bureau of Indian Affairs, 911 NE 11th Ave., Portland, OR 97232 or *Martin Nugent*, Oregon Department of Fish and Wildlife, P.O. Box 59, Portland, OR 97207.

Registration Chair:

Tara Zimmerman, U.S. Fish and Wildlife Service, 911 NE 11th Ave., Portland, OR 97232.

Program Chair:

S. Kim Nelson, Oregon State University, Department of Fisheries and Wildlife, 104 Nash Hall, Corvallis, OR 97331.

Daily Schedule

Wednesday 8 January

Preconference meetings - open to everyone
Executive Council
Marbled Murrelet Technical Committee
Seabird Monitoring
Other committees
Welcome reception in evening

Thursday 9 January

Plenary session morning
Paper sessions afternoon
Evening reception

Friday 10 January

Paper sessions morning and afternoon
Poster session evening

Saturday 11 January

Paper sessions morning
Committee meetings in afternoon
Executive Council
Conservation Committee
Other committees
Business meeting
Evening banquet

Sunday 12 January

Field trips morning and afternoon



REPORTS REGIONAL

Washington and Oregon

Washington

Washington Sea Grant, University of Washington, continues to compare seabird and salmon catch rates in modified gill-nets and across times of day (morning change of light, daytime and evening change of light) in an attempt to develop gears and techniques that reduce seabird bycatch in salmon drift gillnets without significantly reducing salmon catch. Modified gear included monofilament gillnets with the upper seven feet or 15 feet of gillnet replaced with highly visible twine and traditional nets equipped with acoustic alerts or pingers. Experimental nets and traditional nets (control) were fished in the San Juan Islands area of North Puget Sound from 28 July to 29 August 1996 targeting Fraser River sockeye salmon. Data set includes seabird transects at established locations, observations of seabird and marine mammal interactions with the gillnets during each of 668 sets, necropsies and food habit characterization of all 344 seabirds entangled in the fishery, as well as, bird entanglements and fish catch by gear type and time of day. Databases are mostly complete, analyses are in progress, and a final report will be published in March 1997. Results will be presented at the PSG meeting in January.

Ed Melvin is the PI, **Loveday Conquest** is the Co-PI doing statistical comparisons using GLIM techniques, and **Monique Wilson** is doing necropsies and food habit characterizations and coordinated observer activities. Funding is provided by the National Marine Fisheries Service and the Washington Sea Grant Program. In addition, **Tim Brown** is gathering and synthesizing seabird bycatch literature focusing on coastal gill nets and longlines for publication in various forms and **Chris Thompson**, Washington Department of Fish and Wildlife, is characterizing the molt patterns of Common Murres entangled in the 1996 sockeye fishery in an effort to understand their migration pattern into Puget Sound.

Joe Galusha and **Jim Hayward** of Walla Walla College continue to study the influence of Bald Eagle movements over

the Glaucous-winged Gull colony on Protection Island, Jefferson County, WA. The maximum number of eagles using this island for feeding and roosting has increased from 8 to 19 in the last four years. The eagles spend most of their time on logs at the high tide line or on the shingle beach during lower tides. The presence of dead seal pups and placental afterbirth seem to be the primary attractors.

Though the gulls continue to respond frantically to each eagle flight over the colony, few adult gulls or chicks have been taken. It is not clear if these disturbances have affected the breeding behavior and success of these and other seabirds (Pelagic and Double-crested cormorants, Pigeon Guillemots) using this island. Further work will focus on diurnal patterns of eagle and seabird use of various parts of the island.

Martin G.Raphael and **Diane Evans** of the U.S. Forest Service, Pacific Northwest Research Station collaborated on 5 Marbled Murrelet studies in 1996. They completed the third year of at-sea surveys during the breeding season in the San Juan Islands. Their objectives were to refine existing protocols for such surveys, determine distribution and abundance, and estimate productivity based on the ratio of juvenile birds in the population. They are especially interested in whether pre-breeding and post-breeding estimates of density can be used to infer reproductive success. Preliminary estimates suggest that fewer murrelets were detected around the islands than previous years; data on juvenile ratios are not yet available. They conduct this on-going study with the Pacific Southwest Research Station, National Council for Air and Stream Improvement, and Sustainable Ecosystems Institute.

For the second year, they joined with the Quilcene Ranger District of the Olympic National Forest to evaluate Marbled Murrelet habitat characteristics at the stand and watershed levels. Inland dawn surveys were conducted following PSG protocol in three watersheds, each varying in level of fragmentation. Habitat attributes were measured at occupied and unoccupied sites. GIS analysis is now underway to correlate habitat structure, landscape pattern, and occupancy.

Also for the second year, **Martin** and **Diane** collaborated on a study of the risk of Marbled Murrelet nests to predation. Sustainable Ecosystems Institute and the Lab., in cooperation with the Washington Department of Natural Resources, Rayonier Timber Co., the U.S. Fish and Wildlife Service, and National Council on Air and Stream Improvement, are investigating how the numbers of potential predators change with forest stand structure and forest fragmentation, and how the risk of murrelet nests to these predators increases or decreases under different forest conditions. Fifty one corvids were radio-tagged and monitored, and 168 artificial nests were each followed for 30 days on the west side of the Olympic Peninsula. Preliminary results suggest that the interrelationship between forest patterns and human activity may be the biggest influence on predation risk. Even a large forest stand may not buffer a nest from the intrusion of predators associated with a campground, whereas if the human influence is removed, risk of predation may decrease with more contiguous forest.

Martin and **Diane** initiated two new pilot studies in 1996. The first pilot study intended to use radio-telemetered murrelets to investigate inland habitat use and the correlation of foraging and resting areas in Hood Canal with habitat distribution on adjacent Olympic National Forest lands. Capture efforts with net guns during the day and dip nets at night were unsuccessful. When compared to other capture projects using the same techniques, their results suggest that density of birds and possibly time of year influence capture success. They collaborated on a subsequent (post-breeding) capture effort in the San Juan Islands with much greater success (12 captures using dip nets at night). They will attempt to use the same technique next year during the breeding season. The National Council on Air and Stream Improvement and Sustainable Ecosystems Institute are cooperators on this study. Their second new pilot study was conducted in collaboration with **Brian Cooper** of Alaska Biological Research, Inc., which investigated the feasibility of using radar to obtain an index of abundance for Marbled Murrelets at four drainages in the northeastern Olympic

REGIONAL REPORTS

Peninsula. Brian Cooper also began work with Paul Henson of the USFWS on a study testing the use of radar for population monitoring of Marbled Murrelets in Oregon. Initial results of these pilot radar studies suggest that radar is a valuable tool for obtaining indices of abundance of Marbled Murrelets on a watershed scale and that radar techniques show promise as a long-term monitoring tool. Specifically, radar data suggest that the audio-visual technique is not suitable for estimating numbers of murrelets flying up and down drainages: 50 times more birds were detected on radar than audio-visually. Further, it appears that murrelets in Olympic Peninsula drainages were flying into nesting stands in substantial numbers before standard protocol surveys began: a consistent peak in inland-bound movements occurred ~40-80 min before sunrise, followed by a seaward exodus that ended ~1 h after sunrise. In Oregon, however, preliminary data indicate that inland-bound movements occurred later than at the Olympic Peninsula. Radar counts of murrelets increased steadily during the summer, with mean counts nearly tripling between May and July. Within a month, day-to-day variation in radar counts was relatively low ($CV = 14\text{-}29\%$).

Kenneth Warheit has been working with Mary Mahaffy (USFWS) and Denise Daley (Makah Tribe) in designing and drafting the Restoration Plan for the Tenyo Maru Oil Spill. This restoration plan will focus primarily on seabird restoration activities (mostly Common Murre and Marbled Murrelet) in Washington and Oregon, and secondarily on kelp restoration in Washington. Ken has received a grant to work on Common Murre population genetics in British Columbia, Washington, and Oregon, in an attempt to delineate population boundaries and to better assess population-level effects resulting from anthropogenic activities such as oil spills and gillnet bycatch mortality. Ken will also incorporate the genetic analysis with morphometric analyses previously conducted to address several evolutionary biology questions.

Jean Takekawa of Nisqually National Wildlife Refuge (NWR) Complex, is working with Refuge staff to complete a public use plan and environmental assessment at Dungeness NWR. The draft was released this past summer and described reduced public use areas and types of uses to better protect a variety of mi-

gratory birds, including seabirds. The final plan/EA will be completed this fall. Jean assisted Louise Vicencio, biologist at Nisqually NWR, in conducting annual, breeding seabird surveys at San Juan Islands NWR. Ulrich Wilson, Washington Coastal Refuges Office, continued to conduct long-term monitoring of seabirds, Bald Eagles, and Peregrine Falcons.

Oregon

In 1996, Thomas Hamer worked on developing a Predictive Model of Habitat Suitability for the Marbled Murrelet and Habitat Rating Strategy for the Elliott State Forest. The goal of this research conducted by Hamer Environmental was to determine the forest characteristics that could predict site occupancy by Marbled Murrelets on the Elliott State Forest in southwestern Oregon. In 1995, a Habitat Conservation Plan (HCP) for the Marbled Murrelet and Northern Spotted Owl was completed by the Oregon Department of Forestry (ODF) and the USFWS for the Elliott State Forest. The HCP included a landscape level plan with a 60 year incidental take permit for the spotted owl and a six year permit for the take of potential Marbled Murrelet nesting habitat. The plan conserved Marbled Murrelet nesting habitat through a system of long rotation basins, reserve areas, protection of all known occupied sites, and a system of riparian management zones. During the six year HCP time frame, 2,380 acres of unsurveyed potential nesting habitat are planned for harvest, using a habitat rating procedure to minimize risk of harvesting occupied habitat. The purpose of predictive habitat model was to use forest characteristics proven to be important to Marbled Murrelets to predict occupancy and assess the suitability of a stand as nesting habitat. The results of this rating system placed a stand of potential habitat into one of three categories: 1) low; 2) medium or; 3) high probability of occupancy. Timber harvest within a basin would then be allocated to the lowest quality habitat present to minimize take.

A line transect method was developed to sample the habitat that allowed biologists to uniformly sample every acre of a stand in an unbiased manner and was likely not to miss sampling small inclusive patches of suitable habitat. Forty-one forest variables were measured at a sample of 21 occupied and 21 unoccupied stands. Data from occupied and unoccupied stands were analyzed using a t-test

for independent samples, forward stepwise logistic regression procedures, and a cross validation technique that allowed testing the results of the model on an independent sample of stands.

Results of the t-test showed eleven habitat variables were significantly different at $p < 0.05$ and seven variables were significantly different at $p < 0.01$. These variables included the availability of potential nesting platforms (five variables), the density of conifer trees with platforms (four variables), percent moss cover and moss depth on the surface of tree limbs (five variables), average percent slope, and the presence of multiple canopy layers (two variables). The most significant tests were associated with variables that measured platform density, moss cover and moss depth.

Logistic regression was used to test if one or more forest variables would accurately predict stand occupancy. Unlike the t-test approach, logistic regression was able to examine interactions between variables and thus was to predict which combination of variables would best predict occupancy of a stand by murrelets. The two variables in the model positively related to occupancy included the density of 5 inch diameter platforms (large limbs) and percent slope. Moss depth or moss cover variables were likely not included in the model, even though they were important variables from results of the t-test, because platform diameters and counts are made with the moss cover included in the estimate of diameter. Thus platform counts take into account the presence and depth of moss on the tree limbs. One hundred percent of the stands with low probabilities of occupancy (<0.25) were correctly predicted to be unoccupied by this model. Prediction accuracy for stands with a high probability of occupancy (>0.75) were good with 82% correctly predicted to be occupied. In addition, the model had consistent high predictability after cross validation procedures were conducted. Under cross validation, 80% of the stands were correctly predicted to be unoccupied for low probability stands (<0.25) and 80% were correctly predicted to be occupied for stands with a high probability of occupancy (>0.75).

The study produced a habitat model that could predict occupancy of a stand by murrelets and a habitat rating strategy for the Elliott State Forest HCP that had high accuracy, was reliable, and could be used to minimize the take of potential breeding

sites. With the new model results, an assessment of the amount of potential take occurring from the activities proposed in the HCP was possible. In addition, a standardized, repeatable, and reliable field method of measuring the variable habitat conditions on the Elliott was developed that could be used to rate future stands. The study produced information on the forest characteristics associated with Marbled Murrelet breeding habitat in the Oregon Coast Range that could be used for future management direction and led to an increased understanding of murrelet nesting ecology.

S. Kim Nelson and Amanda Hubbard continued to conduct research on Marbled Murrelet Habitat Associations on the Elliott and Tillamook State Forests in western Oregon in 1996. This was the second year of a 5-year project. Tree climbing was again used to locate murrelet nests in occupied habitat. Four old murrelet nests were located, bringing the total to 18 nests on these two state forests (state total is 45). Two of the nests were in Douglas-fir trees and two in western hemlock trees. One nest was in an old-growth forest, two in mature forests with remnant old-growth trees or hemlock trees with mistletoe deformations, and one in a young stand (about 66 years old) dominated by red alder. In the this young stand, individual and patches of mistletoe infested hemlock trees remained after fire and logging providing suitable nesting locations.

An additional old nest was found on BLM lands (Coos District) by climbing trees in an old-growth forest that was proposed for use in a fish habitat improvement project. No active murrelet nests were found in Oregon this summer for the first time since 1990.

Detections of murrelets appeared to be very low on these forests and throughout much of Oregon. Even some known occupied sites had no detections. Perhaps the warm water and changes in ocean currents had an impact on food availability and thus nesting attempts this breeding season.

A one year cooperative study with **Paul Henson** of the USFWS, **Thomas Hamer** of Hamer Environmental, and **Kim Nelson** of Oregon State University, will be conducted in the spring and summer of 1997 to determine if Marbled Murrels are negatively affected by human disturbance. Other cooperators include the USFS, BLM, private industry, and

state forestry and wildlife agencies in Washington, Oregon and California. It is hypothesized that murrels, like many other seabirds, may be sensitive to noise-generating activities such as timber harvest and road repair, but there is no formal research on this issue specific to marbled murrelets. The following questions will be answered: 1) are nesting murrels responsive to proximal human activities that generate aural or visual stimuli, such as chainsaw usage, operation of heavy equipment, and road repair?, 2) what is the nature of the behavioral response to the stimulus, and is there a potential mechanism for adverse affect (such as abandonment of eggs and young)?, and 3) how should current management standards be adjusted in response to these findings?

The research study will attempt to locate up to six active murrelet nests from efforts of the intensive tree climbing research projects described previously and other ongoing survey efforts. Baseline behavioral information will be collected at each nest and then a regime of experimental disturbances applied to each nest. In general, nests will be disturbed up to three times each week through the course of the nesting season. Depending on results, this information may be used to refine current management practices.

Colin Dillingham continued inland surveys for Marbled Murrelets this past season. The Siskiyou National Forest, Rogue River National Forest, and Medford Bureau of Land Management have compiled all surveys and have determined what we believe to be a fairly accurate inland distribution map, which follows closely what he and others published in the Biology of the Marbled Murrelet: Inland and at Sea Symposium Proceedings (Northwestern Naturalist 76(1): 33-39). Essentially, 1995-1996 results support findings of the published manuscript, i.e. murrels are not found further than 28 km inland in the Oregon portion of the Klamath Province. Colin also continues to compile pelagic bird observations for Curry County, Oregon.

The Oregon Department of Fish and wildlife is currently updating the statewide Marbled Murrelet database in their Corvallis office. **Greg Sieglitz** and **Melissa Platt** are compiling the 1994 & 95 data under the auspices of a Sec. 6 contract with the USFWS.

Pat Jodice continued his radio telemetry study of Marbled Murrelets along

the central Oregon Coast during 1996. Only 5 birds were captured as compared to 9 last summer. Although he was not able to obtain any inland locations from these telemetered birds he was able to obtain a fair amount of marine habitat use data. Pat also continued to conduct inland surveys in the Oregon Coast Range. His field crew conducted 50 surveys each at three sites in two stands in Valley of the Giants throughout the summer. Numbers of detections at these sites appear to be quite a bit lower than in 1994. A summary of each of these projects appears in an FY96 annual report which is available from Pat by request.

Under the direction of **Dr. Jan Hodder** of OIMB, students continued with the long-term Pelagic Cormorant monitoring project at Cape Arago. Some nest site abandonment was recorded and productivity was down with only a few nests managing to produce more than a single chick.

Roy Lowe and **David Pitkin** of the Oregon Coastal Refuges Office continued seabird monitoring projects during the summer of 1996. The 1996 breeding season began late and was very poor for some species. Common Murres suffer the greatest impacts due to poor ocean productivity. In late-June through early-July a massive dieoff of adult murres occurred along the Oregon coast. The dead birds washed ashore from Gold Beach, in southern Oregon, to Long Beach, Washington with peak numbers of dead birds recorded from Bandon to Pacific City, Oregon. Every carcass recovered or inspected in the field contained a brood patch indicating that the dieoff involved local breeding populations and not immature nonbreeders. The dieoff occurred at the time period when murre chicks would normally be jumping from the rocks. An aerial reconnaissance was flown on 27 June from Cascade Head, Oregon to Castle Rock near Crescent City, California and revealed a colony abandonment rate of 25-75%. Very few murre chicks were produced along the north and central Oregon coast and none likely survived more than 1-2 weeks at sea. Very low numbers of murres were apparently produced along the southern Oregon coast extending into northern California and the survival of these birds is also questionable.

Linda Glaser of the National Wildlife Health Center assisted with the investigation of the murre dieoff. No infectious agents were found to be involved

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in the dieoff and it appears that the dieoff was the result of food shortage during a critical period for murres. Almost all of the carcasses necropsied were extremely emaciated with no recordable body fat. The weight of the recovered birds averaged more than 200g lighter than birds collected in 1995.

Pelagic Cormorants also had a poor year at colonies monitored annually near Newport. This year recorded the second lowest number attempting to nest at these sites since monitoring began in 1988. Also of interest was the almost complete failure of Western Gulls to produce young at Yaquina Head colonies this year.

Bob Loeffel and Sara Brown continued to conduct their long-term beached bird mortality transects near Newport, Oregon. Their data was crucial in defining the magnitude of the murre dieoff this year. During June and July they recovered 200 dead adult murres on their 4.6 mile beach. This constituted the largest number of dead adult murres recovered on their beach during a two month period since their study began 19 years ago. Another indication of the poor year for murres was the fact that they recorded no dead murre chicks on the beach this year for only the second time ever (1993 was the other year when none were produced at Oregon colonies). In years of normal murre production over 400 chick are recorded here. Four Marbled Murrelets, three of which were hatching year birds, were also found dead during beached bird surveys by Roy Lowe and Bob Loeffel.

Roy Lowe

Pacific Rim

Ross Sea: **David Ainley**, of H.T. Harvey and Associates, and **Peter Wilson** (NZ) (and friends) are beginning a project that will attempt to answer the question: Why do Adelie Penguins breed in colonies of differing size? And why have small colonies been increasing faster than large ones for the past 15 years? Project includes--at each of 3 colonies within one colony cluster (metapopulation)--radio telemetry (to determine degree to which individuals from different colonies feed in the same area); direct and stable isotope analysis of diet; breeding success; immigration/emigration; and foraging effort

(developing an automatic scale to identify and weigh individual birds).

California Current: **D. Ainley and L. Spear**, also of H.T. Harvey and Associates, are monitoring the disposal of dredged materials disposal in the deep ocean off San Francisco. Includes weekly trips of mud scows/tugs and regional oceanographic cruises. Deep ocean disposal is a new option for dredged materials; EPA and Army Corps are watching it closely.

Alaska: **David Ainley and Glen Ford** (ECI) are involved in the APEX project in Prince William Sound. They will be modeling seabird breeding and trophic interactions towards an understanding of why certain species have not recovered from the Exxon Valdez Oil spill.

Pacific: **Larry Spear** and **Chris Ribic** (U. Wisconsin), with **Steve Buckland** (UK), are developing the statistics by which to accurately determine at-sea densities (and variances) of seabirds as determined from strip censuses. With **D. Ainley**, they are applying the technique to estimate population size of a few dozen central Pacific seabird species.

D. Ainley has been involved with the Friends of the Red Road who, among other things, are attempting to preserve the small populations of Newell's Shearwaters that are breeding in the Puna District of Hawaii (Big Island). Potential impacts include increased lighting (to which fledglings are attracted) and powerlines (into which fledglings and adults fly), and the mining of gravel from small cinder cones, which comprise the nesting habitat of the species in the District.

General Note: changes in eastern Pacific avifauna seems to be afoot these days (or is it just a temporary glitch?). During the past 18 months the following seabirds of the Peru Current and Galapagos region have been sighted in the California Current, most for the first time in recorded history: Light-mantled Sooty Albatross, Salvin's Albatross, Parkinson's Petrel, Dark-rumped Petrel and Swallow-tailed Gull.

David Smith of the State of Hawaii, Division of Forestry and Wildlife - Oahu reports State Seabird Sanctuaries and other seabird nesting colonies in the County of Honolulu (including Kure Atoll) were surveyed using a combination of incidental visits and observation, on-site mapping, direct counts, estimation counts, point counts, and helicopter and fixed-wing aerial photo analysis. The State is

developing permanent survey plots and identifying the preferred survey methodology in order to reduce disturbance and provide accurate counts. Partial support for this project has been provided through Pitman-Robertson Funds from the U.S. Fish and Wildlife Service.

Estimates of nesting pairs were made for Laysan and Black-footed albatross, Red-footed, Brown, and Masked boobies, Brown and Black noddies, Red-tailed Tropicbirds, Great Frigatebirds, Grey-backed, White, and Sooty terns, Christmas and Wedge-tailed shearwaters, Bonin and Bulwer's petrels, and migratory shorebirds (Ruddy Turnstones, Bristle-thighed Curlew, Golden Plovers, Wandering Tattlers, etc.).

Scott Johnston reports the U.S. Fish and Wildlife Service's Ecological Service's office in Honolulu recently reorganized to more fully implement ecosystem management. Self-directed work teams, staffed by biologists with diverse backgrounds, now focus on specific islands or islands group.

The teams include the Big Island, Kauai, Oahu, Maui - including Molokai, Lanai, and Kahoolawe, Mariana Islands, American Samoa, and Remote Islands. Of most interest to PSG members due to the significant seabird resources is the Remote Islands team which is encompasses all U.S. jurisdiction in the Pacific. The team overlaps considerably with the Service's Remote Island Refuge (Refuge staff serve unofficially on the Remote Islands Team).

The Remote Island Team is currently developing "ecosystem" plans for each of the U.S. jurisdiction islands. The plans will highlight the significant resources of each island and outline needed research to help prioritize conservation in the area. Anyone interested about the Remote Island Team can contact **Scott Johnston** (See Executive Council List for address).

A number of PSG members recently began discussion of tropical seabird conservation and how the PSG can be more involved. To facilitate further discussion of the issues and solutions to tropical seabird conservation in the Pacific, and how PSG can use its considerable influence to make a difference, an informal meeting will be held at the Annual Meeting in Portland. Your participation is much-welcomed, now, in Portland, or at any time. Please watch for the announcement at the meeting.

Vanessa Gauger, University of Hawaii,

recently moved to La Jolla, California where she is writing her dissertation for the University of Hawaii. Her dissertation research in the Northwestern Hawaiian Islands was on reproductive behavior and parent-offspring interactions of Black Noddies.

Cathleen Natividad-Hodges, Haleakala National Park, continues to monitor endangered Hawaiian Dark-rumped Petrel nests. There are about 1,000 known, mapped burrows at Haleakala, of which 60-80% are entered each year by petrels. The Park also continues to maintain traps for alien predators (cats, rats, and mongoose). Banding fledglings will begin October 7, a process begun in 1990. 152 fledglings have been banded this year, at the time this report was submitted.

During the week of October 14th, the Park staff anticipate many calls for petrel and Wedge-tailed Shearwater that are found in urban areas. (The shearwaters nest outside of the Park at sea level.) The birds become confused by bright urban lights and often crash into the ground. Together with the State Division of Forestry and Wildlife, the Park sends out press releases and posters for public information. Most groundings occur during the new moon, which is October 12. Last year, 10 petrels and 11 shearwaters were reported and retrieved (2 of each species died).

Park staff has also been consulted on a number of Environmental Assessments that involve petrels: GTE Hawaiian Tel plans on installing a fiber optic ductline adjacent to a petrel colony; The Federal Aviation Administration plans on installing microwave dishes at their remote site near a petrel colony; State of Hawaii, together with local television and radio stations, plan on building a "antenna farm" to consolidate antennas that are near the summit of Haleakala, and adjacent to petrel colonies. Staff from the Ecological Services office of Fish and Wildlife Service are also being consulted on these projects.

Mark Rauzon is working with the U.S. Marine Corps at Kaneohe Bay, Oahu to assist recovery of the red-footed boobies at Ulupau Crater. In August, an untimely fire caused by artillery killed about 40 boobies (about 1800 nests were counted in 1996.) The Marines were in the process of installing a 20,000 gallon water tank to irrigate native Hawaiian vegetation to act as a succulent firebreak and to di-

rect the nesting birds out of harms' way by providing alternative nest sites for the future.

Scott M. Johnson

Canada

This report summaries information on the recent field season for a few major projects. No one has actually analyzed their data yet, so this is based on first impressions only. I have allowed my informants to speak for themselves.

At Large

Thijs Kuiken of the Department of Veterinary Pathology, University of Saskatchewan, has just completed the field component of a three-season study of Newcastle Disease (ND) and other mortality factors at a colony of Double-crested Cormorants at Dore Lake, Saskatchewan. An outbreak of ND in 1995 has permitted comparison of mortality factors in outbreak and non-outbreak years. Laboratory studies in parallel with this work have focused on the immunological responses of nestlings to the ND virus, susceptibility to infection and the duration of virus shedding in infected birds. **Wanjala Lusimbo**, of the same Department, is doing laboratory studies of the effects of external oil contamination on avian embryos; chicken and mallard embryos are being used as general avian models.

The Canadian Cooperative Wildlife Health Centre (CCWHC) continues to monitor the occurrence of diseases of all kinds in Canadian wildlife, including marine birds on Pacific, Arctic and Atlantic coasts. The CCWHC assists wildlife biologists with information and advice regarding wildlife disease issues and provides a variety of wildlife health services such as diagnosis of disease conditions. The July 1996 issue of the CCWHC Newsletter (available free of charge) contains short articles on a wreck of fulmars on the Pacific coast during the winter of 1995 and of the mortality events in Redhead Ducks and in Tundra Swans in the Great Lakes region. The CCWHC can be contacted in Canada at 1-800-567-2033, internationally at 306-966-5099 or via electronic mail at ccwhs@sask.usask.ca.

Atlantic

John Chardine summarized Canadian Wildlife Service activities during the 1996 season in insular Newfoundland:

At Witless Bay (Great and Gull Islands), Baccalieu Island and Cape St. Mary's, overall breeding success of Black-legged Kittiwakes was much higher in 1996 than in the years 1990-1995 and phenology was earlier by 2+ weeks. Gull predation of kittiwake eggs and chicks at Witless Bay was less significant than in previous years. However, kittiwake success was still significantly higher at colonies without large gulls (Baccalieu and Cape St. Mary's) than at colonies with gulls (Witless Bay). Capelin came inshore earlier in 1996 than in recent years but not as early as 1980s. Water temperatures were higher in April and May this year and the spring diatom bloom occurred two weeks early.

Factors affecting breeding success of Herring Gulls were assessed for about 100 pairs on Gull Island. Breeding success was low in 1996. Mean clutch size was low but egg survival was high. Breeding failure occurred mainly during the chick rearing period when conspecific predation of chicks was high.

The impacts of tour boat operations on the behavior of murres, Razorbills, puffins, and kittiwakes nesting on Gull Island was assessed to provide guidelines for provincial managers and the tour boat operators."

Ian Jones reports the activities of the Atlantic Cooperative Wildlife Ecology Research Chair in 1996 in Newfoundland and Labrador:

At the newly restored field station at Gannet Islands, Labrador a long-term study was initiated at the site of intensive work in the 1980s by **Tim Birkhead** and **David Nettleship**. **Ian, Tarmo Poldmaa, Monica Kidd, Mark Hipfner, and Rachel Bryant** (M.Sc student, Memorial University) measured seabird productivity and diet and commenced marking birds for demographic work. Overall, productivity was high, although capelin were virtually absent from Common Murre chick diet (in previous years Common Murres fed their chicks almost entirely on capelin while Thick-billed Murres fed their chicks blennies). In 1996 both species' chicks grew on blennies alone. Thick-billeds seemed to be working hard, with a maximum dive depth of 174m recorded on a depth gauge recovered from an adult provisioning a chick. Thick-billed Murre populations continued to

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expand at this site. Arctic Fox were restricted to a single island in the archipelago and thus had reduced impact this year. Atlantic Puffin chicks were fed larval fish and managed to fledge in the absence of capelin. Over 600 adults were colour-marked for survival studies. Razorbills had rather low fledging success, possibly due to a shortage of sandlance.

At Hebron Fiord in northern Labrador, **Michael Rodway, John Goss** and **Ian Fong** investigated the distribution and habitat preferences of the threatened Eastern Harlequin Duck in a collaborative project with **Scott Gilliland** (CWS), **Ian Jones** and **Bill Montevercchi**. The field team discovered the first nest of this species recorded from eastern North America. In addition to the nest find, their use of river and estuarine habitats was documented in this area, part of the proposed Torngat National Park.

At Gull Island in Witless Bay, Newfoundland, **Ed Hearne** (M.Sc student of **Ian Jones** and **John Chardine**) investigated the impact of tour boats on breeding seabirds. Murres and kittiwakes seem to be fairly well habituated to the presence of tour boats, but Razorbills may be being negatively affected since they were observed deserting their nest sites at the approach of vessels. Significant disturbance due to jet skis, recreational boaters, and a helicopter chartered by the Discovery Channel (a Toronto based cable channel) were observed. A fishing vessel went aground and leaked fuel at nearby Green Island in the Witless Bay Ecological reserve, raising concern about threats posed to seabirds by uncontrolled boating in this area.

In the Bay of Fundy, **Tony Diamond** (ACWERN, University of New Brunswick) is collaborating with **David Nettleship** and **Colin MacKinnon** of the Canadian Wildlife Service to establish long-term studies of diet and demographics in Atlantic Puffins, Razorbills, and Arctic and Common terns on Machias Seal Island. He writes: "M.Sc student **Krista Amey** completed her second field season there in 1996, when weather and feeding conditions lowered nesting success of all four species way below 1995 levels. In 1995, Honours student **Bridget Morrison** compared impacts of disturbance created by tourists and researchers. Ph.D student **Kim Mawhinney** completed a second year studying brood ecology of common eiders; eider broods again suffered almost complete predation from Great Black-

backed Gulls despite an experimental partial cull and complete hatch-prevention of gulls. The 2 pairs of Razorbills **Kim** found on South Wolf in 1995 - the first nesting recorded there, within the new Black-legged Kittiwake colony (see Canadian Field Naturalist, in press) - had increased to at least 4 pairs in 1996. Ph.D student **Falk Huettmann** is investigating relationships between distribution patterns of seabirds at sea and environmental parameters, using the PIROP database for seabirds and incorporating many satellite-derived and other digital databases. In Labrador, **Ian Jones'** studies of diets and demographics will parallel those on Machias Seal Island, and allow comparison with CWS work there in the early 1980s."

From the Dartmouth, N.S., office of the C.W.S., **David Nettleship** reports:

Studies of Atlantic Puffin continued at Machias Seal Island, New Brunswick, with assessment of productivity, condition of young at fledging, and resightings of birds banded as fledglings in earlier years (study initiated in 1984). Production in 1996 was relatively low, possibly related to a diminished supply of food during the chick-rearing period (absence of herring).

Analyses of breeding populations of Northern Gannet in Newfoundland (Cape St.Mary's, Baccalieu, and Funk Island) were completed in winter 1995-96. A full status report of the North American gannet population is scheduled for publication in early 1997.

A major analysis of the seabird world of Labrador is nearing completion. This is a region of incredibly high sea-cliffs with a myriad of islands and inlets, which together with patterns of ice break-up and movement, influence greatly the biological productivity of the Labrador Sea and its use by seabirds. The 423 seabird colonies, comprising over 500,000 seabirds of 13 species, display a fascinating non-random pattern of distribution with concentrations of avian biomass associated with upwelling waters and converging currents. About 75% breed at five major "hot spots". This study is to be completed in March 1997.

Arctic

The Canadian Wildlife Service camp at Coats Island continued through its 13th season, jointly operated by **Tony Gaston** and **Grant Gilchrist**. It was another very early year and the Thick-billed Murre colony continues to expand, with new

ledges colonized in several areas, mainly by 4-6 year old birds. The usual quota of about 2000 murres was banded, including about 300 adults from which blood samples were taken by **Gabriella Ibarguchi**, who has started an M.Sc. (Queen's University) on within-colony genetic structuring. In addition to the usual demographic work, a project was undertaken on the effect of egg-size on hatchling size and intensive observations of chick diets were made to examine individual variation in adult feeding. A party including **Vicki Johnston** (Canadian Wildlife Service), **Jean-Louis Martin** (Centre National de Recherche Scientifique, Montpellier), **Steve Smith** and **Jane Whitney** (Foxe Basin Project) visited Prince Charles Island, one of the remotest areas in the northern hemisphere. The island is an important breeding area for Sabine's Gulls, jaegers and Red Phalaropes as well as several other species of shorebirds.

Pacific

Wendy Beauchamp, Simon Fraser University, describes the 1996 (third) field season on Marbled Murrelet Habitat and Demography in Desolation Sound/Theodosia Inlet, B.C.: "This research is a co-operative project led by **Fred Cooke** (NSERC/CWS Wildlife Ecology Chair, Simon Fraser University) in conjunction with **Gary Kaiser** (C.W.S.), **Tony Williams** (SFU), **Kathy Martin** (CWS/University of B.C.) and the B.C. Ministry of Forests. **Wendy Beauchamp** and **Lynn Lougheed** (SFU) and crew ran a capture and banding program in Theodosia Inlet during June - August during which time 105 murrelets were captured. Of these, 95 new individuals were banded and 10 individuals were recaptured from previous years. A total of 493 murrelets have been banded in this population since 1991. In conjunction with graduate student **Cecilia Betancourt-Lougheed** (SFU), 50 Marbled Murrelets were tagged with radio transmitters, some of which were also individually color-marked with either nasal disks ($n=10$) or temporary wing tags ($n=48$). Boat-based transect surveys and telemetry were conducted to determine seasonal movements and foraging locations of birds during the breeding season. Aerial telemetry was conducted with the assistance of **Sean Boyd** (C.W.S.) in attempts to locate nests and to track movements of murrelets on birds on the water. Behavioural observations of

fish-holding by murrelets were conducted by **Pascal Dehoux** (CWS) to estimate the proportion of the murrelet population which was feeding chicks in the area. Blood samples were collected from all banded birds and DNA sexing and hormonal analysis will be conducted by graduate student **Brett Vanderkist** (SFU). Recently completed analysis of DNA from birds banded in 1994 and 1995 (n=177) indicates a skewed sex ratio of about 2 males: 1 female. Hormonal assays will be used to determine breeding status of individuals which will be compared to Cassin's Auklets on Triangle Island, B.C. Radar to record the number and time of night that Marbled Murrelets use Theodosia Inlet as a flight corridor was conducted in conjunction with **Doug Bertram** (SFU). A pilot capture project of a population of Marbled Murrelets using a different forest ecosystem was conducted in the Queen Charlotte Islands (Moresby Island) by **Gary Kaiser** and crew where 9 Marbled Murrelets were banded and blood sampled in June. **Irene Manley** (SFU), and crew continued her second year of forest activity surveys and intensive nest searches in the Desolation Sound area. This data on forest habitat use will complement the information on marine distribution and inventory work conducted by the B.C. Ministry of Environment on the Sunshine Coast for a more complete picture of habitat requirements for this species. This year, 380 trees were climbed, and 23 new nests were found in old-growth stands. At least 2 of these nests hatched successfully. Several of the trees showed evidence of re-nesting attempts (multiple nest cups). The total number of nests found in this area since 1994 is 32."

Doug Bertram reports on research at Triangle Island in 1996: "The CWS /SFU Triangle Island Seabird Research Station operated from 21 March until 25 August. Reproductive success of Cassin's Auklets was low; many chicks perished or fledged at low weights. **Hugh Knechtel** (SFU) examined parental morphological attributes and body condition (as gauged by blood physiology) and its effects on chick growth, and size at age of fledging. We are investigating the use of blood physiology as a gauge of breeding status in Cassin's Auklets in a comparative study with the Marbled Murrelet (see Desolation Sound project). Food samples delivered to nestlings were collected and coordinated with a zooplankton cruise con-

ducted by **Dave Mackas** from the Institute of Ocean Sciences, Department Of Fisheries and Oceans. Cassin's Auklet nestling growth and diet from Triangle Island will be compared to **Anne Harfenist**'s results from Frederick Island in the Queen Charlotte Islands. **Doug Bertram** and **Alan Burger** (University of Victoria) deployed a radar unit to track Cassin's Auklet activity and timing of colony attendance for 10 consecutive nights near hatching. An intensive ongoing capture/recapture program for Cassin's Auklet demographics completed its third year thanks largely to **Laura Cowen** and **Mike Wiley**.

Rhinoceros Auklets experienced low hatching success and low fledging success. **Laura Jones** (SFU) examined Rhinoceros Auklet parental provisioning rates in relation to chick condition (gauged by size at age and blood physiology). Chick growth and diet will be compared with the same measures from Anthony Island in the Queen Charlottes and Seabird Rocks on the West Coast of Vancouver Island (**Gail Davoren**, University of Victoria). Demographic studies of Rhinoceros Auklet adults also completed year three. Tufted Puffins experienced almost complete reproductive failure. For a second year, **Colleen Cassidy** St. Clair (University of Alberta) examined the effects on gull kleptoparasitism and nest location on puffin fledging success. A pilot supplementary feeding study was initiated. Blood samples were collected from chicks to examine body condition and for comparison with Rhinoceros Auklet nestling blood parameters. The small Common Murre population on Triangle Island appeared successful, as gauged by nesting activity and food delivery rates. **Suzanne Romaine** (working for **Julia Parrish**, University of Washington) used decoys to examine the effects of social aggregations on attendance behaviour. Photographs of the breeding colony taken during a 1989 census were repeated."

Alan Burger reports on seabird research at the University of Victoria: Marbled Murrelet research continued in the Carmanah-Walbran valleys for the sixth consecutive year. This year we expanded the range of habitat types being investigated in the forest, and did some pilot studies using satellite-imagery to characterize murrelet habitats. **Sharon Dechesne** is wrapping up her M.Sc study of Marbled Murrelet vocalizations. Mi-

chelle Masselink began her M.Sc. research on the role of Steller's Jay as a predator of Marbled Murrelets. Using radio-telemetry and point-count sampling she is investigating habitat use by the jays in disturbed and undisturbed forests in which murrelets are known to nest. At-sea surveys of seabirds along the West Coast Trail continued, with the support of Pacific Rim National Park, with the primary focus being to determine Marbled Murrelet distributions, habitat preferences and seasonal chronology. **Alan Burger** and **Trudy Chatwin** of the Wildlife Branch (B.C. Ministry of Environment, Lands and Parks) began an extensive program of research and monitoring of Marbled Murrelets in Clayoquot Sound. Radar censusing was done at fifteen watersheds, and inland surveys were made in most watersheds. At-sea surveys were done by **John Kelson** and **Adrienne Mason** as part of this project. **Gail Davoren**'s M.Sc study of Rhinoceros Auklets at sea and at the Seabird Rocks colony continued for the second year, with the goal of determining the effects of variable prey distributions and densities on foraging and breeding behaviour. Field work was completed in **Alan Burger**'s study of seabird oceanography on the shelf off Vancouver Island, and data analysis and write-up are in progress.

Anne Harfenist continued her study of Cassin's Auklet demography at Frederick Island, in Haida Gwaii (Queen Charlotte Islands): "Our chicks did fine again and the timing of breeding was similar to the last two years. Food samples were collected and have been sent for analysis. Our banding went well and we should be able to produce an estimate of adult survival this year. We caught at least three birds banded as chicks in earlier years. With **Todd Columbia** of Parks Canada, I completed the second year of a study of Rhinoceros Auklet chick growth and provisioning at S'gan Gwaii. Timing was approximately one week later than in 1995 and food was mainly sandlance and herring. Following all that, we visited Englefield Bay to monitor raccoons and shot the only one seen on a seabird island - on Helgesen. There were lots of scats in the den entrance, most containing feathers. No evidence of raccoons was found by Parks Canada on any of their seabird islands.

Elsewhere in Haida Gwaii, the Laskeek Bay Conservation Society, continued to monitor Ancient Murrelets and

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other seabirds at East Limestone Island and adjacent areas. Camp was run by **Colin French** and **Virginia Collins**. It was another early year for nesting, and reproductive success of Ancient Murrelets was high, with monitored burrows producing a record average brood size at departure. Total numbers of chicks trapped increased for the first time since 1990, perhaps because there have been no raccoons active on the island during the last two breeding seasons. Two birds banded as chicks on the island are now breeding in monitored burrows: one 3, the other 5 years old. Numbers of Marbled Murrelets and other birds seen on transects at sea were lower than normal, but weather was generally rather unsettled and may have caused problems for observers.

Your humble Canadian compiler: **Tony Gaston**.

Alaska-Russia

Beth Agler and crew (Fish and Wildlife Service) ran small boat surveys of Prince William Sound during March and July 1996 to estimate population abundance of marine birds. The surveys were the same as those conducted after the Exxon Valdez oil spill during 1989-91 (Klosiewski and Laing 1994), 1993 (Agler et al. 1994), and 1994 (March only, Agler et al. 1995). We used three 25-foot Boston Whalers to survey transects divided among three strata: shoreline, coastal-pelagic, and pelagic. We then used a ratio estimator to estimate population abundance. Estimated population abundance of all marine birds in July was lower (246,575+41,400) than 1993 (371,327+58,189), and estimates for March were lower (253,001+34,917) than those from 1994 (320,470+62,640).

Dee Boersma and crew (University of Washington) are still writing up research based on their Barren Island work. Several papers are in progress on various aspects of the breeding biology of Fork-tailed Storm-Petrels and examining decadal variance in the breeding parameters of several seabirds in the Barren Islands.

David Irons and **Rob Suryan** are continuing their studies of Black-legged kittiwakes in Prince William Sound (PWS) as part of the Alaska Predator Ecosystem Experiment (APEX) funded by the

Exxon Valdez Oil Spill Trustee Council. In conjunction with other APEX seabird and forage fish projects in PWS and Lower Cook Inlet, data are being collected to quantify changes in kittiwake productivity and foraging relative to forage fish composition and abundance. Detailed studies of kittiwake productivity, chick growth, adult body condition, diets, and foraging are being conducted at three colonies in PWS and the remaining 24 colonies are surveyed to determine population size and productivity throughout PWS. In addition to APEX-related topics, they are continuing long-term projects to study productivity, foraging, and survival of known-age birds.

Alexander Ya. Kondratyev reports that his team (laboratory of coastal ecology) conducted field investigations in the Northern Sea of Okhotsk. They have two on-going cooperative projects with Alaskan specialists. In the Seabird Colony Catalog project (with **Kent Wohl** and **Vivian Mendenhall**, USFWS), they checked a number of the colonies in the northern part of the Sea of Okhotsk. They plan to finish computerizing all the data for the project this winter. Another project provides comparative analyses of the productivity and demographic state of the main seabird species in Gulf of Alaska and Sea of Okhotsk, while **Scott Hatch**, continued monitoring of populations at Talan Island, focusing on kittiwakes, murres and auklets. Last Spring his group published the third issue of the Bulletin "Seabirds of Beringia" with American support and participation. A popular instruction manual for seabirds found beached or caught in fishery operations was also prepared and published by the laboratory.

This winter the group plans to continue work on these projects and will provide results in the next issue of Pacific Seabirds. They also would like to write a proposal for a Marbled Murrelet project. Observations in 1996 showed that the fledged chicks of this species swim down streams to the sea in August. In Motikley Gulf (northern Sea of Okhotsk) many of these chicks reached the coast during low tide and were killed by dogs, gulls and other predators. They hope to conduct intensive investigations of this topic and would be happy to invite volunteers, as well as researchers and students, to participate in their field work on Talan Island and on the Okhotsk Sea coast next season.

Don Dragoo, **Terry Carten**, and

Mike Schwitters conducted productivity monitoring and kittiwake survival monitoring at St. George Island during the summer of 1996. **Art Sowls**, **Laurie Fairchild** and **Deb Rudis** assisted us with population monitoring counts during July as well.

Jill Anthony, Ph.D. candidate at Oregon State University, conducted field research as part of the EVOS Trustee Council-funded APEX Project on seabird reproductive energetics as it relates to diet in the Exxon Valdez oil spill area. Jill focused on quantifying the energy intake of kittiwake broods at Shoup Bay in Port Valdez, where **Dave Iron's** and his field crews have been monitoring kittiwake productivity. Kittiwake productivity was high this year at Shoup Bay. Sand Lance appeared to be more prevalent in the diet compared with recent years, a hopeful sign that sand lance populations in the Sound may be recovering.

Pigeon Guillemot research in Kachemak Bay, funded by the Coastal Marine Institute at UAF with help from **John Piatt**'s APEX research in Lower Cook Inlet, continued for the third consecutive year. **Alex Pritchard** successfully defended his thesis on the first two years of Kachemak Bay Guillemot research. **Mike Litzow** headed up the field crew this year, with able assistance from **April Nielson**. They were joined in mid-July by **Pam Seiser**, an M.S. candidate at University of Alaska Fairbanks, and her assistant, **Cynthia Restrepo**, who had been working on guillemots breeding on Jackpot Island in Prince William Sound as part of the EVOS Trustee Council-funded Nearshore Vertebrate Predators Project. Unfortunately for **Pam**, **Cynthia**, and the Jackpot Island guillemot population, a large (and offensively odiferous) male mink made his way out to the island and managed to destroy the contents of all the 40+ guillemot nests there.

Marc Romano, M.S. candidate at Oregon State University, and his assistant **Mark Kosmerel** raised kittiwake and puffin chicks in captivity on controlled diets at Kasitsna Bay Lab, as part of the APEX Project. The chicks were raised on pure diets of either pollock, sand lance, or capelin to investigate the relative quality of these forage fishes as food for nestling seabirds. As predicted, the chicks on sand lance or capelin diets did better than those on the pollock diet.

Leslie Slater reported that her groups is just beginning to analyze their data, but

so far it looks like burrow-nesters (Fork-tailed & Leach's storm-petrels, Tufted Puffins & Rhinoceros Auklets) did much better at St. Lazaria in 1996 than in 1995 (the first years for which they have "good," standardized data). They suspect that drier weather at critical times during the breeding season resulted in fewer burrows being flooded. They also collected diet samples through the chick-rearing period to detect any changes there which could also affect the breeding effort. Ledge-nesting (Common & Thick-billed murres, Pelagic Cormorants), crevice-nesting (Pigeon Guillemots) and ground-nesting (Glaucous-winged Gulls) adults were present in similar numbers in both years, and their productivity appeared similar in both years. They also recorded water temperatures (~10 m depth) near annual monitoring sites to identify correlates with prey abundance.

Lindsey Hayes, Ted Spencer, Mark Russell, and Bryan Duggan continued studies of the breeding and feeding ecology of Pigeon Guillemots at Naked Island in Prince William Sound, Alaska as part of the APEX project's 1996 field season.

Kathy Kuletz reported that she has been chained to her desk working on reports, proposals and manuscripts including "Relative abundance of adult and juvenile Marbled Murrelets in Prince William Sound, Alaska: Developing a productivity index" with **Steve Kendall** and **Debbie Flint**; "A productivity index for Marbled Murrelets based on surveys at sea," with **Steve Kendall**; "Post-fledging behavior of a radio-tagged juvenile Marbled Murrelet" and "Use of Forested and unforested nesting habitat by Marbled Murrelet in Southcentral Alaska", both with **Dennis Marks**. She also assisted the US Forest Service on some inland murrelet surveys on Chichagof Island (southeast Alaska), and assisted **John Piatt**'s crew in Kachemak.

From ABR in Fairbanks, came reports on the following projects: **Bob Day** and **Debbie Flint** began studies on the biology of Kittlitz's Murrelets in Prince William Sound. **Betty Anderson** and colleagues conducted surveys on distribution and abundance, nesting densities, and reproductive performance of Spectacled and King eiders in the Kuparuk Oil field of arctic Alaska. **Rick Johnson** and colleagues conducted surveys on distribution and abundance of Spectacled and King eiders and Yellow-billed, Pacific, and Red-throated loons on the Colville River

Delta of arctic Alaska during nesting and brood-rearing. **Alice Stickney** and colleagues conducted surveys on distribution and abundance and reproductive performance of Brant in the Kuparuk Oil field. They also banded Brant again this year. **Bob Ritchie** conducted extensive aerial surveys of Brant colonies across the coast of arctic Alaska. **Steve Murphy** and colleagues conducted bird and mammal surveys in Prince William Sound.

Togiak NWR continued monitoring shore-based populations and productivities of Black-legged Kittiwakes, Common Murres, and Pelagic Cormorants at Cape Pierce in 1996. Kittiwakes and murres were collected for stomach contents in May, June, and July. Shore-based populations and productivities of kittiwakes and murres were monitored at Cape Newenham in 1996. **Lisa Haggblom** entered data from Bristol Bay colonies into the Pacific Seabird Monitoring Database, and completed kittiwake and murre counts from boat-based photographs taken in 1994 for the Walrus Islands State Game Sanctuary in Bristol Bay. **Scott Hatch, Charla Stern, and Lisa Haggblom** banded 42 adult Common Murres with color and steel bands at Cape Pierce in July 1996. They noosed the birds while standing above them. This was the first seabird banding project at Cape Pierce and banding will continue in 1997, so that adult survival can be estimated.

Alan Springer is continuing to monitor diets of seabirds on the Pribilofs in collaboration with NMFS and local hunters.

Vivian Mendenhall and **Shawn Stephensen** conducted a census of seabird colonies on the north coast of St. Lawrence Island, in cooperation with **Caleb Pungowiyi**, a native of the island who is now a state leader in Native resource management. In spite of the usual problems with weather, the new data are a vast improvement on previous colony censuses, which were old and imprecise. Several new breeding records also were obtained.

Vivian Mendenhall has been appointed to the Planning Team of the North Pacific Fisheries Management Council. The team favors incorporating the needs of seabirds into the annual catch limits for groundfish fisheries in the Bering Sea and Gulf of Alaska. **Vivian** welcomes discussion about how this should be accomplished.

Tony Degange drafted a Conservation

Assessment for the Marbled Murrelet in Southeast Alaska. This assessment was prepared under the auspices of a memorandum of agreement among the Fish and Wildlife Service, USDA Forest Service, and Alaska Department of Fish and Game. It was prepared as part of the revision of the Tongass Land Management Plan. The assessment will be published as a Forest Service Technical Report.

John Maniscalco and **Bill Ostrand** of the APEX Seabird/Forage Interactions study participated in 3 cruises focusing on different questions. During June, they visited sites known to be forage-flock hot spots. We watched flocks form to determine which species initiated foraging. In July they participated in the APEX cruise and collected seabird data during both the near shore and off shore cruises. In August, **Maniscalco** collected data on the SEA programs diel survey. This study conducted hydroacoustic surveys of bays selected for large herring populations. The surveys were repeated 3 times within 24 hour periods. This study will examine the diel movement of forage fish and the corresponding response of seabirds. During their field work, **John** and **Bill** rescued four people (equipped only with two survival suits) from a burning vessel in Prince William Sound.

Alexander Golovkin reports that the economic situation in Russia kept him out of field this past summer. He and **Kent Wohl** (USFWS) are discussing the opportunity of monitoring the seabirds of the Komandorsky reserve in the future.

As part of the long-term monitoring program on the Alaska Maritime NWR, data on productivity, population trends, timing of nesting events, and/or food habits were collected for indicator species of fish-eating and plankton-feeding seabirds at the following annual monitoring sites: Cape Lisburne - **Dave Roseneau, Mary Portner, and Peter Chance**; Bluff - **Ed Murphy**; St. Paul - **Lisa Climo, Holly Welsh, Jessica Wechtel, Art Sowls, Vernon Byrd, and Jeff Williams**; St. George - **Don Dragoo, Terry Cartin, Lorie Fairchild, Deb Rudis, Art Sowls, and Mike Switters**; Aiktak - **Susan Woodward, and Carl Lunderstadt**; Kasatochi/Koniiji - **Greg Thomson, Lisa Sharf, Jeff Williams, Vernon Byrd, and Laura Gresslinius**; Buldir - **Julian Fischer, Lisa Meehan, David Clutter, and Pat Ryan**; East Amatuli - **Arthur Kettle, Margi Blanding, Dave Roseneau, Stephanie Zuniga, Leslie Slater**,

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Carrie Alley, and Jonathan Meletta; and St. Lazaria - Leslie Slater, Sharon Loy, Janet Morre, and Chris Maranto.

In addition to annual monitoring, intermittent sites were surveyed in the eastern Aleutians (i.e. Kaligagan I. and nearby islets, Egg I., the Baby Islands) by **Vernon Byrd, Jeff Williams, Laura Grefenius, Gary Wheeler, and Art Wemmerus.**

As part of the "Seabird, Marine Mammal, Oceanography Coordinated Investigations" (SMMOCI), **John Piatt's** crew from NBS joined **Vernon Byrd, Jeff Williams, and Doug Palmer** aboard *Tiglax* to conduct a characterization of the nearshore marine habitat near Kasatochi and Koniuji Islands. During APEX field work under the direction of **John Piatt**, the USFWS vessel *Tiglax* rescued two adults and two children from the waters of Cook Inlet.

Dave Roseneau and Arthur Kettle continued research in the Barren Islands in connection with the *Exxon Valdez* Restoration APEX study. **Dave Roseneau, Art Sowls, Vernon Byrd, and others** continued to analyze stomachs of halibut and Pacific cod to evaluate relative abundance of forage fish that provide prey for seabirds in the Barren Islands, Pribilof Islands, and central Aleutians.

Restoration of seabird populations continued in the Aleutians with fox removal projects at Seguam and Gareloi islands, efforts led by **Steve Ebbert and Tom Paragi**. These two islands have high potential for recovery of seabirds after introduced foxes are removed.

Art Sowls continued to work with local people and other agencies to improve the rat prevention program in the Pribilofs and the shipwreck response program on the Alaska Maritime NWR. He also coordinated response to the M/V Citrus oil spill in the Pribilof Islands. **Gary Kaiser, CWS, and Jeff Williams** evaluated the potential for removal of Norway rats to restore seabird populations at Great Sitkin Island using techniques similar to those employed at Langara Island over the past 2 years. **Julian Fischer** began a study of food habits and contaminants levels in Harlequin Ducks at Shemya Island. **Mark Krom and Joe Meehan** continued the seaduck monitoring program at Shemya.

Scott Hatch spent much of his summer in the lower 48 states of the US, but oversaw three projects.

Controlled feeding experiment with black-legged kittiwakes on Middleton Island: Things went pretty much according to plan--basically, a crew headed by **Verena Day** went to Middleton with 3 tons of herring and proceeded to feed them to the kittiwakes, one at a time! The results should be very interesting, but the whole design was compromised to some extent by the fact that the natural food supply of kittiwakes seemed to be much better than anything seen in many years.

Satellite telemetry with common and Thick-billed Murres in the Chukchi Sea: This is a continuation of his group's work last year (which was funded in part by EVOS, now strictly an NBS effort on behalf of MMS). During the year we analyzed the 1995 data transmitters at the Barren Islands, Cape Thompson, and Cape Lisburne. Results were presented in a report to *Exxon Valdez* Oil Spill Trustees. This year they scaled down to using 16 transmitters at one study site, Cape Lisburne.

Paul Meyers and Dan Mulcahy implanted 10 Thick-billed Murres and 6 Common Murres with satellite transmitters at Cape Lisburne. Everything went well, and they are already getting data. Nothing unusual to report at this point--the birds have been spending most of their time off the Cape Lisburne coast. So far there have not been the mortality problems observed last year. It's too early to sound the all clear bell, but they are optimistic. They did some post-surgery behavioral observations between the implanted murres and a captured control group, that was anaesthetized, and surgically sexed. The results show that the control birds were much more likely to return to the colony and more likely to retain their breeding status. Unfortunately the implantations disrupted all breeding attempts.

Pacific Seabird Monitoring Database. **Charla Sterne** is orchestrating this process and working on development and use of the Pacific Seabird Monitoring Database (PSMDB), a microcomputer-based data management and distribution system intended to make the largely uncollated and inaccessible volume of North Pacific seabird observations available in a timely manner. This effort is cooperatively sponsored by the National Biological Service, several offices of the Fish and Wildlife Service and the Pacific Seabird Group (who in turn have agreements

with PRBO and Simon Fraser University in place).

The PSMDB is a relational database, designed to work with observations arranged in time series, or sets of comparable observations that can be meaningfully plotted on an X-Y graph to show trends over time. Each observation represents one measurement of a particular population parameter for a given species in a given location and year. Ancillary data which completes the record includes contacts, documentation, sponsors and sampling design information. Among the typical parameters to be reported are population numbers, productivity, reproductive chronology, food habits and survival. The database consists of 22 tables, 14 of which are updatable by the contributor.

A PSMDB data entry application utilizing a run-time version of Microsoft Access has been developed and distributed to nine participants from the National Park Service (California), U.S. Fish and Wildlife Service (Alaska, Oregon, Hawaii), Point Reyes Bird Observatory (California) and Simon Fraser University (British Columbia). Once submitted, the data will be compiled. The comprehensive database will then be redistributed to the contributors. The application is currently designed for data entry and editing only. Other functions yet to be developed include: database querying by location, species, parameter, etc.; generation and presentation of time series plots; statistical analysis; and, mapping (GIS) capabilities.

Denny Zwiefelhofer reports that the main projects on the Kodiak National Wildlife Refuge (KNWR) during 1996 evolved around Harlequin Ducks. KNWR finished a third year of spring and late summer coastal population surveys and began a cooperative study with the National Biological Survey and National Park Service, with *Exxon Valdez* Oil Spill Trustee funding. The project involved capture, color-banding, and taking of blood for genetic typing of coastal Harlequin Ducks from Kodiak, Katmai (Alaska Peninsula) and Prince William Sound populations. Over 300 harlequins were captured from three different bays along the Kodiak refuge's western coast, 287 of these were color-banded and 167 genetic samples were taken. Capture and banding are scheduled to continue in Fiscal year 97. Searching the refuge's major interior freshwater habitats for breeding har-

quins continued in 1996, with two additional watershed surveyed.

Another project, carried out by Heidi Brokate at KNWR, involved comparing three years of seabird colony photographs within a fisheries enhancement area of Spiridon Bay, with actual colony counts. Many of the photographs were unfortunately not of the highest quality, but there does seem to be potential for using good-quality photographs for monitoring small colonies. Counts from higher-quality photographers were often more than 95% of the actual colony counts. The main problems seemed to be lighting and distance from the colony. Many photographic limitations may be mitigated or alleviated by utilizing digital 35 mm or video cameras that can provide sharper images for enlarging. This would also provide a digital means of permanently documenting annual breeding distribution of the surveyed colonies.

With lots of donations, David Duffy is working with the Centers for Disease Control to set up a breeding colony of *Ixodes uriae*, the tick vector for *Lyme borreliosis*. David leads the multi-investigator APEX PROJECT, examining whether food limits recovery of seabird populations following the *Exxon Valdez* oil spill.

David Duffy

Southern California

The California Least Tern working team is meeting the 13th of November in Huntington Beach to discuss this past season's results and to try to come to agreement on how to document causes of mortality. PSG members Pat Baird, Doreen Statlander and Tim Burr will attend.

Pat Baird is continuing a four-year study on the foraging ecology and food habits of California Least Terns in a study supported by the US Navy. She and her students are developing a new generation of dyes with which to mark birds. These dyes will be especially important for seabird researchers who have had bad luck with available dyes which tend to wash off. She also is working on Brown Pelican foraging and a forage fish food chain study with two of her students. In her "spare time" she plays the frame drum in a women's drumming group, Lipushiau,

which performs at universities and coffee houses.

Lisa Ballance is continuing her studies analyzing eastern tropical Pacific seabird foraging ecology and community structure. She is also analyzing data on the seabirds of the western tropical Indian Ocean that Bob Pitman and she collected during 1995. Next year she hopes to travel to the north Pacific gyre and the Maldives for some more field work.

Bob Pitman was at sea for most of 1996, conducting research on marine mammal distribution and abundance in Antarctic waters, the Gulf of Maine, Gulf of Mexico, and waters of the California Current. In December, he will travel to waters off the coast of Madagascar to study the population status of blue whales. Next year promises to be much the same, with field work planned in Antarctica, the north Pacific gyre, and possibly, the Maldives. He has not forgotten seabirds; he continues to work on papers dealing with foraging ecology of various species using data collected from the 20-some years of cruises he has made in the eastern tropical Pacific. He has been back in town for an amazing five weeks straight, so catch him now if you want to talk to him!

Harry Carter (Biological Resources Division, Dixon Field Station) wandered down into Southern California territory this summer, and worked on 1) the annual monitoring of Brandt's and Double-crested cormorant colonies throughout the Channel Islands; 2) surveys of Xantus' Murrelet at most of the Channel Islands; and 3) on the nesting of the Ashy Storm Petrel at Santa Cruz Island.

The Biological Resources Division-CSC (San Francisco Bay Estuary Field Station) also continued a Xantus' Murrelet radio telemetry study in the Southern California Bight. For more detailed information, see the Northern California section.

Charlie Collins continues his monitoring contracts on California Least Terns and Snowy Plovers in Southern California with U.S. Navy support. He and student Mike Taylor are continuing studies of survival and determining the wintering areas of Black Skimmers. They also are looking at the growth and development of Forster's Terns. Student Amy Gorospe is looking at contaminants and metal accumulation in a group of terns and skimmers. This is a cooperative project with Mike Horn (Cal State Fullerton) and colleague Zed Mason at Cal State Long Beach.

Hugh Ellis is working on energetics of Florida Scrub Jays at the Archibald field station in Florida. He continues as the Director of the Marine and Environmental Studies Program at the University of San Diego.

Richard Erickson is consulting on coastal sage scrub issues in California, working on Pacific Pocket Mice, and doing research on migrant land birds in Baja California.

Bill Everett continues to do work on the ecology of seabirds on Los Coronado Islands and on Snowy Plovers on the Channel Islands. He is still very busy as Chairman of the Pacific Seabird Group and has established new criteria for communicating to the Executive Council via e-mail. He will implement Robert's Rules of Order at the Portland Executive Council meeting to make the meeting run more efficiently. So watch out! No filibustering!

Gene Fowler is in Argentina working on adrenal stress hormones on penguins in an area about 500 km south of Punta Tombo where he worked over ten years ago. Gene is still in touch via his Pomona e-mail address if you want to contact him.

Judith Hand has taken a short hiatus due to family commitments.

Michael Horn and his students are working at the Bolsa Chica Ecological Reserve on the ecology and digestive physiology of terns and skimmers nesting there. This past summer his student Patricia Coe worked on the rate of foraging and rate of provisioning of adult Caspian and Elegant terns to their chicks which were held in enclosures on the nesting islands. The object of this research was to see if the two species differed in their rates of provisioning. Rates are being analyzed at present. Also, Kristin Chavez brought chicks of Elegant and Caspian terns into captivity and fed them to determine their rates of gut passage, their growth, and their maintenance ration to see if the digestive process is the limitation to how often the chicks are fed in the field. These results are also currently being analyzed. Another student, Wasila Dahdul studied the pattern of daily foraging activity in Caspian and Elegant terns and in Black Skimmers. These data are also being worked up. Mike also has comparative data on foraging ecology of these birds at Bolsa Chica and the Salt Works in south San Diego Bay. Wait for the results at the Portland meeting in January! Until then, good luck reaching

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Mike; he is pretty much incommunicado. And just to make sure that he had no spare time at all, he put in for and received a 3 year Sea Grant award to study the food chain structure and heavy metal accumulation in the birds at Bolsa Chica. He will be undertaking stable isotope analysis to determine trophic position and feeding locations at Bolsa Chica Reserve, using mass spectrometry to analyze all elements in the food chain up through the birds, to assay for accumulation of heavy metals. These investigations will begin next nesting season. Mike will have a reference site to compare with these data from Bolsa Chica, either Elkhorn Slough or Humboldt Bay. The trainee working on the Sea Grant with Mike will be **Darryl Smith**. And finally (!), Mike is completing related work on topsmelt, one of the most important forage fishes of these birds.

George Hunt was invited to a Gordon Conference as co-chair of a working group in the Pacific Marine Science Organization (Pices) in an effort to estimate prey consumption by marine birds and mammals from 30 degrees N to the Bering Straits. He will attend and present a poster at another Gordon Conference on Sea Ice ecology to be held in February in Nanaimo. He will continue to keep busy and out of trouble, attending the American Society of Limnology and Oceanography in Santa Fe in March, as well as attending a forage fish symposium sponsored by ICES in Scotland. Student **Jen Zamon** is studying the foraging ecology of bird and mammal aggregations in the San Juan Islands and has recently been awarded an EPA fellowship to support this work. Student **Libby Logerwell** is working with George to examine the distribution of birds around the Pribilofs. **Libby** expects to finish her Ph.D. by June 1997. **Sasha Kaitaysky** is in the process of finishing his Ph.D. thesis on the Sea of Okhotsk off Japan where he is studying the developmental physiology of alcids. He will finish his thesis in January 1997 and will be moving to Seattle for a post doctorate with **John Wingfield**. Another student, **Kyra Mills** is finishing her Master's at Irvine in December 1996, on mixed species foraging flocks in the Galapagos with an emphasis on the foraging behavior of the Galapagos Penguin. Student **Cheryl Baduini** has just returned from her first field season on Tern Island in French Frigate Shoals where she is working on the foraging behavior and ecology of Wedge-tailed Shearwaters. She is espe-

cially interested in whether parents or offspring control the rate at which offspring get fed. Just in case he runs out of things to do, **George** is applying to the NSF to look at foraging ecology of shearwaters at the inner front of the Bering Sea and is struggling to write up the results of three-years' worth of field research in the western Aleutians where he looked at the foraging ecology of auklets with respect to hydrography and prey availability and abundance. A Canadian group studying the north water polynya near northwest Greenland has invited **George** and some students to join them if the Canadians are funded. Send chocolate covered coffee beans to **George** to help him with his busy schedule.

David Hyerenbach is on a CALCOFI cruise and is doing research at Scripps Institute of Oceanography.

Kathy Keane is doing a survey on bird abundance and distribution in the Ballona Wetlands in order to help in the planning for a reconstruction of the largest wetland remaining in Southern California. She is editing a paper already peer-reviewed for publication in Western Birds on pelican flight behavior at San Pedro breakwater. She presented a poster at the Colonial Waterbirds meeting on recruitment in Least Terns with respect to when their parents nested, where they nested and whether their parents exhibited any mate fidelity, and natal philopatry. She is teaching biology courses at various schools in the Los Angeles area while monitoring numbers of California Least Terns in Batiquitos Lagoon and at the Port of Los Angeles.

Libby Logerwell, a graduate student of **George Hunt**, is working with a group of people from the National Marine Fisheries in the Alaska Fisheries Science Center to examine the distribution of birds around the Pribilof Islands with respect to the hydrography, and in particular, to the distribution of zero- and one-year age pollock. She will also be working with **Gordon Schwarzman** from University of Washington on a statistical analysis of spatial organization of these prey and their bird predators.

Paige Martin, Channel Islands National Park, is working on the PSG data base entering all their data from 1990 to the present, and will eventually include all data from 1986 to the present. This year, **Paige** helped coordinate the projects of **Harry Carter**, **Frank Gress** and **Scott Newman**. One highlight of the summer

was the banding of Brown Pelicans and Storm-Petrels in one 24 hour period: the largest and smallest seabirds in the Park. This breeding season went really smoothly with lots of cooperative and well-coordinated effort. More work was completed than usual, thanks to the above teams of people and to **Jennifer Roth**, the PRBO field assistant, and to the Channel Island National Park volunteer, **Shaye Wolf**, who worked with **Jennifer** on Santa Barbara Island, collecting data.

Pat Mock is about to start research for a resource management plan for Pt. Mugu Naval Air Station, on San Nicholas and San Miguel Islands. He is also involved in the Oases Project to compare biodiversity on Air Force training ranges with that of adjacent land which is managed differently. He continues to study the impact of noise on passerine and riparian birds, and soon will be involved in an infrared sensing project for studying bighorn sheep and antelopes. Later in the year, along with **Hugh Ellis**, he will be going to Florida to look at energetics of Florida Scrub Jays at the Archibald field station.

Mark Pierson is involved in a study of distribution and abundance of shorebirds in Ventura County, trying to target which beaches not on military land are most important for shorebirds. Some of the beaches in Ventura County are still "wild" (for Southern California) and are targeted for development. His study (with **Mike McCrary**) will find which beaches should be managed more for shorebirds and less for development. **Mark** and **Mike** are completing their third and final year on this project in cooperation with **Jenny Dougan**, from UC Santa Barbara, who is a specialist in soft substrates, and who will be sampling for prey species. **Mark** is also conducting a study in cooperation with UC Santa Cruz on oil spill prevention and response in a study funded by CDF&G. He, **Mike McCrary**, **Ken Briggs**, and **Mike Bonnell** (UC Santa Cruz) are flying aerial surveys monthly in the Santa Barbara channel and Santa Maria basin (north of Point Conception) for coastal and marine birds during 8 months of the year, concentrating their effort during the migratory months. The purpose of the study is to provide baseline data for nearshore divers, deep water alcids and other seabirds, as well as marine mammals in order to update data from 15 years ago.

Nancy Read at Vandenberg AFB has the best-kept secret in Southern Califor-

nia: Vandenberg is a Mecca for breeding seabirds. California Least Terns and Western Snowy Plovers as well as other colonial seabirds breed on the rocky mainland cliffs there. Unfortunately, only endangered species studies are funded, so she gathers data on the other species in her spare time. She has documented Brandt's Cormorants' breeding on the Vandenberg coastline the last two years, and she does these counts from shore because the colonies are so accessible. Colonies are in the north and south Vandenberg areas. The breeding species that occur there are: Pigeon Guillemot, Least Tern, Western Snowy Plover, Brandt's and Double-crested cormorant, Rhinoceros Auklet, Black Oystercatcher, Western Gull, and Peregrine Falcon. Destroyer Rock/Point Pedernales is one of the "hot spots." The number of Pigeon Guillemots at Vandenberg comes close to the number which breed in the Channel Islands (1000 at Point Arguello and 1480 overall). Near the Least Tern colony many Brown Pelicans roost, and Vandenberg's Peregrine Falcons also nest near the seabird colonies, making for many hours of good data-collecting.

Doreen Statlander is a student interested in the way seabirds make use of the pelagic realm during their foraging trips. Particularly, she wants to address how seabirds may be relying on hydrographic and biological oceanography features characterized by high production and aggregation of prey biomass. Her other interests of include the use of seabirds as biosensors for oceanography, and the need for long term population and reproductive data to address seabird conservation issues.

She has established a collaboration with Dick Veit and she is relying on the CALCOFI cruises to gather data on albatrosses off southern California. In addition to the oceanographic correlates of their distribution, she is looking at their ship following behavior.

Stu Warter is still teaching vertebrate zoology and marine ornithology at California State University Long Beach. His graduate student, **Mike Autch**, is working on aggressive interactions in wintering Western Sandpipers.

Walter Wehtje is still attending UC Riverside in a Ph.D. program under **Tom Scott**. He is currently working on land birds, looking at their breeding abundance and dispersion on San Nicholas Island. He is especially interested in juvenile dis-

persal patterns.

Robin Ward has been working at Sea World since 1989, and is a senior aviculturist there, tending seabirds such as penguins and puffins, many species of waterfowl, as well as flamingos (who at least get their feet wet, even if they aren't officially seabirds), as well as shorebirds. Currently she is working in the Penguin Encounter and is involved in the management of the breeding season in the alcid exhibit where Atlantic and Tufted Puffins and Common Murres breed. She began her seabird career by volunteering at the San Diego Natural History Museum under **Phil Unitt**, preparing bird skins for the bird collection there. At the museum, she met **Bill Everett**, and later worked as a field assistant under him at Coronado Islands studying Black Storm-Petrels. After that she became involved with the Loggerhead Shrike program on San Clemente Island, again with **Bill Everett**. She went on to help out on Project Puffin with **Steve Kress** off the coast of Maine on Seal Island. The last project she worked on was with **Julia Parrish** (University of Washington) on experiments determining the degree to which murres possess an inherit response to gull alarms (they played recordings of gull alarms and watched the responses of Common Murres). She hopes to do more field work specializing in alcids and seabirds. She is also interested in helping out on the Mexico Committee because she is bilingual, and has done some bilingual media work.

Pat Baird

Northern California

Sarah Allen and Sarah Koenig (Point Reyes National Seashore), in cooperation with Point Reyes Bird Observatory, have initiated a predator exclusion study with Snowy Plovers breeding on beaches within the Point Reyes National Seashore. During the 1996 season, a total of 10 enclosures were placed over nests on Limentour and Point Reyes Beaches in an effort to protect the nests from predation by Common Ravens. Monitoring and field work was conducted by PRBO; Americorp assisted with deployment of the enclosures. The enclosures were remarkably successful; a total of 16 chicks

fledged this year compared to 4 in 1995. The study will continue next year and the number of enclosures deployed will be increased to 20. **Sarah Allen** continued to oversee the monitoring of Common Murre colonies affected by the 1995 *Wayfarer* grounding. Monitoring of this study is being conducted by PRBO. Efforts are also underway to augment the GIS mapping capacity of PRNS for oil spill response purposes.

David Ainley and Larry Spear (H.T. Harvey and Associates) have participated in weekly tug boat trips and three regional oceanographic cruises since November of 1995 in order to monitor potential effects of the disposal of dredge spoils on marine wildlife at a dump site located 20 miles west of the Farallon Islands. This study, organized by the EPA and the Army Corp of Engineers, is funded by the Port of Oakland. **Ainley** and **Spear** have also been involved with the assessment of habitat use and breeding success of Snowy Plovers at the Baumberg Tract in Hayward, California. This 850 acre site is slated to be restored to tidal wetland. Planning for the restoration work is still in progress and involves balancing the needs of the plovers with those of the endangered California Clapper Rail and Salt Grass Harvest Mouse. Monitoring of a wetland previously restored by H.T. Harvey biologists in the California Central Valley continued for a second year. In 1996, 19 breeding pairs of Snowy Plovers in addition to several dozen other shorebird species utilized the site. **Ainley** and **Spear** continue to develop and improve statistical techniques to estimate seabird populations at sea. Results of one exercise indicated that at-sea estimates were within 2-13% (depending on the species) of island-based estimates for populations that have been well-studied on land and at sea. **Ainley** and **Spear** attended a second workshop on at-sea census techniques during which an agreement on survey protocols was reached. The workshop, which took place in Cambridge, England, was sponsored by the Scientific Committee for Antarctic Research.

Dan Anderson (University of California at Davis) and his graduate students are finishing a five-year study on the effects of mercury on Western/Clark's Grebes at Clear Lake, California. Aspects of this study include on-going population and contaminant monitoring and analysis of feather elements (conducted by **Tom Cahill**) in order to: 1) identify and charac-

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terize contaminated habitats; 2) study age and sex differences; 3) document trophic changes in contaminants; and 4) identify geographic variation among groups of birds using different lakes. Anderson is also working on identifying historical and current levels of contamination at Clear Lake. Future work in this area will include the genetic analysis of grebe populations and interchanges, analyses of Western/Clark's Grebe interactions (with **John Eadie**), continued research into the historical aspects of contamination at the lake, and the immunological effects of oil and handling stress on coastal-wintering grebes (with **Ken Briggs** and **Erik Gershwin**). Funding and at least one graduate student are being sought for the work on Western/Clark's Grebe interactions. Research on the Brown Pelican continues; **Eduardo Palacios** is working on a variety of projects including the establishment of time/activity budgets and habitat use of breeding pelicans, growth and development studies, and micro-habitat use patterns and influence on pelican performance. Anderson continues his research on the long-term population trends and conservation status of the subspecies and is also working with **Jim Keith** on preparing a 25-year summary of contaminants in the Gulf of California.

Esther Burkett (California Dept. of Fish and Game) continued to coordinate the monitoring of Marbled Murrelets in the Santa Cruz mountains. This research was conducted in cooperation with the USFWS, NBS (**Harry Carter**); Yale University (**Steve Bisenger** and **Ben Becker**); the Santa Cruz Mountains Murrelet Group (**Stephanie and Steve Singer**); and Humboldt State University Foundation (**John Bulgar**). Assistance was also provided by the Big Creek Lumber Company. This year, one active nest was discovered in an abandoned squirrel nest at Big Basin Redwoods State Park; two sets of egg shell fragments and a grounded juvenile were also found. At-sea surveys were conducted between Half Moon Bay and Santa Cruz, CA, focusing primarily on the waters around AZo Nuevo Island.

Harry Carter, **Gerry McChesney**, and **Bill McIver** (NBS - California Science Center, Dixon Field Station) continue their involvement with several cooperative projects: 1) the *Apex Houston Seabird Restoration Project* (with USFWS, National Audubon Society, PRBO); 2) status of the Common Murre

in California, Oregon, Washington, and British Columbia (with USFWS); 3) status of the Common Murre at the South Farallon Islands (with PRBO and USFWS); 4) Marbled Murrelet Recovery Team (with USFWS); 5) Marbled Murrelet research in central California (with California Dept. of Fish and Game and Yale University); and 6) annual monitoring of Common Murres and Brandt's and Double-crested Cormorants (with USFWS and CDFG). Research on the Channel Islands (with **Darrell Whitworth** and **John Giardini**) is also continuing. These projects include: 1) annual monitoring of Brandt's and Double-crested cormorant colonies throughout the Channel Islands; 2) Xantus' Murrelet surveys at most of the islands; and 3) nesting of the Ashy Storm-Petrel at Santa Cruz Island. Radiotelemetry with Xantus' Murrelets in the Southern California Bight (with **John Takekawa** and **Laird Henkel** - NBS-CSC, San Francisco Bay Estuary Field Station) continued in 1996. Murrelets were captured at night in the waters around Santa Barbara Island and fitted with radios. Aerial surveys were then conducted to track the birds at sea. Telemetry work, conducted in cooperation with the Wildlife Health Center at UC Davis (with **Scott Newman**), was undertaken in order to study stress arising from capture and handling. These radiotelemetry studies have been funded by and conducted cooperatively with several agencies including: U.S. Navy (Legacy Resources Management Program and Point Mugu Naval Air Weapons Station); CDFG (Wildlife Management Division and Office of Oil Spill Prevention and Response); USFWS (Sacramento Ecological Services); NOAA (Channel Islands National Marine Sanctuary); and Humboldt State University. Also of note: as of the 1st of October, NBS has become part of the U.S. Geological Survey (Biological Resources Division - BRD). Fortunately, the mission and goals of BRD remain the same as those of NBS. **McChesney** is in the final stages of writing his M.Sc. thesis on the breeding biology of Brandt's Cormorants on San Nicholas Island. He hopes to have it completed within the next few months.

Frank Gress (California Institute of Environmental Health) has been working collaboratively with **Harry Carter** to develop a method of characterizing the breeding effort and reproductive success of Brown Pelicans, Double-crested Cormorants and Brandt's cormorants using

large-format, high resolution photography. This technique, used by the National Marine Fisheries Service to census whale and pinniped populations, provides 5"x5" photographs that are extremely high in quality. Comparisons with both 35mm photographs and those taken from a 70mm Hasselblad camera indicate that the method holds a lot of promise for obtaining information on the reproductive success of pelicans and the nesting effort of Double-crested Cormorants. For Brandt's and Pelagic cormorants, however, photographs taken with a 35mm camera still produced the best results. Gress and Carter are seeking additional funding to conduct more surveys using the large-format equipment (owned by NMFS) in 1997. Because of the increase in numbers of Pacific Sardine in southern California waters, Gress is hoping to obtain funding to update information on the diet of Brown Pelicans and Double-crested Cormorants. He also plans to publish an update of organochlorine contaminant levels for these two species in the Southern California Bight.

Jim Harvey and graduate students at Moss Landing Marine Laboratories are continuing to conduct marine bird and mammal surveys in Monterey Bay. They are presently conducting 1-2 surveys per month until December 1996. The objective of the study is to relate the presence of predators with hydro-acoustic information that may indicate the distribution of prey. In some cases, net sampling is employed to determine species composition and size within the prey patches. **Harvey** and students are also monitoring the reproductive success of Brandt's Cormorant colonies along the Monterey peninsula. Specific objectives of this research include determining the chronology of nesting and fledging success as well as estimating the foraging area of birds at these colonies.

John Hunter and **Kristin Schmidt** (Six Rivers National Forest), **Howard Stauffer** (Humboldt State University), **Sherri Miller** and **C.J. Ralph** (USFS - Redwood Sciences Lab), and **Lynn Roberts** (USFWS - Arcata Office) are completing a two-year study of Marbled Murrelet distribution in the southern portion of FEMAT Zone 2 (President's Forest Plan) in northern California. No murrelets were detected in this region in over 2,184 intensive surveys. Efforts are currently underway to expand the project into the northern portions of Zone 2.

Scott Newman (Wildlife Health Center, UC Davis) concluded the third year of data collection for the Baseline Seabird Blood Reference Range Project, a study funded by CDFG-OSPR. With help from numerous collaborators (USFWS, NBS, PRBO, CINP, USGS, California Institute of Environmental Health), blood samples, used to determine the health of wild bird populations and to assess the impact of environmental pollutants on marine bird health, were collected during the past season from Common Murres on S.E. Farallon Island, and Xantus' Murrelets, Brown Pelicans, and Western Gulls on Santa Barbara Island. **Newman** also collected blood samples from Common Murres as part of a beached bird mortality study conducted by **Ted Buerger, Roy Lowe, and Dave Pitkin** (USFWS - Portland ES Field Office and Oregon Coastal Refuges). Samples collected from Oregon birds will be compared to samples from murres on the Farallon Islands in order to gain an understanding of regional differences in health parameters. Additionally, blood samples from Double-crested Cormorants at Spider Island, IL (with USFWS - Green Bay, WI) were collected and will be compared to samples from birds in Oregon and Maryland. As part of his ongoing work with OSPR, **Newman** will perform necropsies of Common Murre carcasses collected along the central California coast between June and September 1996. These data will be added to necropsy results taken from 40 murres that died during the spring of 1995.

Point Reyes Bird Observatory

Farallon Island and Marine Programs: **Bill Sydeman, Peter Pyle, Michelle Hester, Nadav Nur, and Tom Schuster** continued to monitor the demography and diet of twelve (potentially 13) species of seabirds and five species of marine mammals at the South Farallon Islands. **Sydeman and Nur**, in cooperation with **Harry Carter and David Gilmer** (NBS - California Science Center, Dixon Field Station) are developing a population viability analysis of Ashy Storm-Petrels in California. **Tom Smith and Derek Girman** (SFSU) will conduct an examination of genetic differentiation among populations of Ashy Storm-petrels as part of this research. **Hester, Sydeman and Nathan Fairman** finished a 5th year of monitoring Rhinoceros Auklets and other seabirds at Ano Nuevo Island, with

funding from the Monterey Bay National Marine Sanctuary and the Coastal Conservancy. **Hester** is completing her MS thesis work at Moss Landing Marine Laboratories on the ecology of Rhinoceros Auklets in central California. **Sydeman and Fairman**, in conjunction with **Daphne Hatch** (Golden Gate National Recreation Area), initiated a study of the effects of human disturbance on Brandt's and Pelagic cormorants, Pigeon Guillemots, and Black Oystercatchers breeding on Alcatraz Island, where over one million tourists visit annually. **Sydeman, Nur, and Schuster**, in conjunction with **Paul Kelly** (CDFG - OSPR) are continuing investigations of the effects of chronic oil pollution on seabirds in central California. In addition, PRBO is continuing with the maintenance and training of California's oil spill wildlife response team.

Sydeman, Mary Beth Decker, Dan Howard (Cordell Bank National Marine Sanctuary), and **John Mason** are investigating the relationship between the Point Reyes Upwelling Plume and the distribution and abundance of macrozooplankton, larval and juvenile fish, and seabirds. This study will examine temporal and spatial patchiness in plankton and forage fish populations as well as the manner in which upper trophic level predators respond to oceanographic fronts (where temperature and salinity change) and prey distributions.

Sydeman, Nur, and Paige Martin (Channel Islands National Park) are investigating the effects of Western Gull and House Mouse predation on the viability of the Ashy Storm-Petrel population on the Farallon Islands, and Barn Owl and Deer Mouse predation on the viability of the Xantus' Murrelet population of Santa Barbara Island. **Sydeman, Martin, Jennifer Roth** (PRBO) and **Shaye Wolfe**, in conjunction with the Channel Islands National Park, are continuing to monitor the population size, productivity, and phenology of eight species of seabirds on Santa Barbara Island.

Pacific Flyway Project: **Gary Page and Lynn Stenzel** are continuing with the process of summarizing many years of data from the Pacific Flyway project. They have also collaborated with the Point Reyes National Seashore and USFWS/SFBNWR on predator exclusion studies with the endangered Snowy Plover.

Mono Lake: **David Shuford** completed the 15th year of monitoring the

population size and reproductive success of California Gulls in relation to water level changes at Mono Lake.

Other Regions: Shuford and others continued with surveys of all California and Ring-billed gull colonies in California. Shuford plans to produce a status review of the Black Tern for USFWS and hopes to initiate surveys of interior populations of tern species and Double-crested Cormorants.

San Francisco Bay Bird Observatory

SFBBO celebrated its 15th anniversary this year. Biologists continue to monitor gull and tern colonies in the south San Francisco Bay area, including the California Gull colony in Alviso (the second largest in the state). Two pairs of Black Skimmers nested in the area for the third consecutive year. One nest produced 4 chicks (3 of which were banded), the other nest failed. Observatory biologists are continuing their efforts to monitor the reproductive success of Forster's and Caspian tern colonies in their study area.

USFWS/San Francisco Bay NWRC

The *Apex Houston* seabird restoration project, led by Refuge biologist **Mike Parker**, was initiated in December 1995. **Elizabeth McLaren and Susan Schubel**, with help from **Harry Carter** (NBS) and a host of other people, deployed decoys on 12 and 13 January 1996 at Devil's Slide Rock. In early March, **Jennifer Boyce, Phil Capitolo, and Mari Ortwerth**, and joined the restoration team. Information on attendance patterns, behavior, productivity, diet, and anthropogenic factors was collected from Common Murre colonies at Point Reyes headlands, Castle Rocks, and Hurricane Point Rocks in addition to Devil's Slide Rock. The Refuge is working cooperatively with NBS, Humboldt State University Foundation, National Audubon Society, and PRBO on this project. Aerial surveys of seabird colonies located throughout central and northern California were conducted as part of an ongoing effort to monitor long-term trends in breeding population sizes.

Refuge biologist **Erin Fernandez** continued to work with PRBO to evaluate the effectiveness of predator exclosures to protect Snowy Plover nests at the Salinas River NWR and several other sites throughout the Monterey Bay area. Exclosures were not used during the first half of the nesting season on the Refuge.

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However, high rates of nest loss due to mammalian predators required the use of exclosures during the second half of the season. Predator management continued in early 1996 at the Refuge, Fort Ord, and both CDFG and private lands. Results indicated that the program was highly effective. Sixteen chicks fledged from the Refuge, compared to just 3 in 1995. The USFWS will fund predator management activities during 1997.

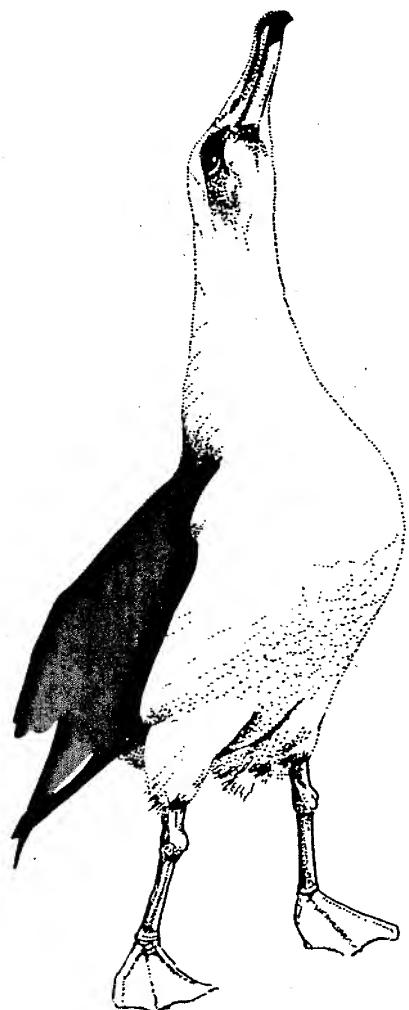
Refuge biologist Joy Albertson and others are continuing efforts to monitor the recovery of California Clapper Rail populations in San Francisco Bay marshes. The overall population appears to be stable, but recent winter airboat surveys have detected changes in rail popu-

lations within certain marshes. Clapper Rail numbers have greatly increased in areas under intensive predator management (to control exotic red foxes and feral cats), however, populations in the West Bay, where predator management activities are impeded by public use, are decreasing. Albertson completed her Master's thesis on the ecology of the California clapper rail in south San Francisco Bay in December 1995 (congratulations Joy!). Her research focused on: 1) the impact of non-native red fox predation on rail populations, 2) the home-range, movement, and survival of rails, and 3) the effects of contaminants on rail reproductive success.

Other News

The next California Seabird Research Coordination Workshop will be hosted by D. Michael Fry at the UC Davis campus. The meeting had originally been planned for 12-13 December 1996, however, conflicts with other meetings have made it necessary to reschedule. New dates have yet to be determined, but will likely be sometime in early December. For more information, contact Mike Fry at (916)752-1201.

Elizabeth McLaren



BOOK REVIEWS

Laysan Island And Other Northwestern Hawaiian Islands History And Bibliography

Atoll Research Bulletin Numbers 432-434

No. 432. Three Months On A Coral Island (Laysan) By Hugo H. Schauinsland [1899] Translated By Miklos D.F. Udvardy

No. 433. History And Ornithological Journals Of The Tanager Expedition Of 1923 To The Northwestern Hawaiian Islands, Johnston And Wake Islands. By Storrs L. Olson

No. 434. An Annotated Bibliography Of Laysan Island, Northwestern Hawaiian Islands By Roger B. Clapp, Miklos D.F. Udvardy and Angela Kay Kepler. Issued By The National Museum Of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. February 1996.

No. 432. A special issue of the Atoll Research Bulletin titled "Laysan Island and other Northwestern Hawaiian Islands: Early Science Reports with a Laysan Island Bibliography" includes Dr. Miklos D.F. Udvardy's translation of an important journal of Hugo Schauinsland's three month expedition to Laysan Island with his wife in 1896. Several years in the making, this translation by PSG's second Lifetime Achievement Award recipient is an important perspective on Laysan--the 'gem of the Leeward Hawaiian Islands' at a time before the island was destroyed by guano miners, feather hunters and rabbit depredations.

This perspective is especially important now as the USFWS plans to restore some of the vegetation of Laysan Island to this period. Udvardy himself visited Laysan in 1961 with the Harold J. Coolidge Expedition and vowed to translate this volume 30 years ago. We are grateful his pledge has been fulfilled.

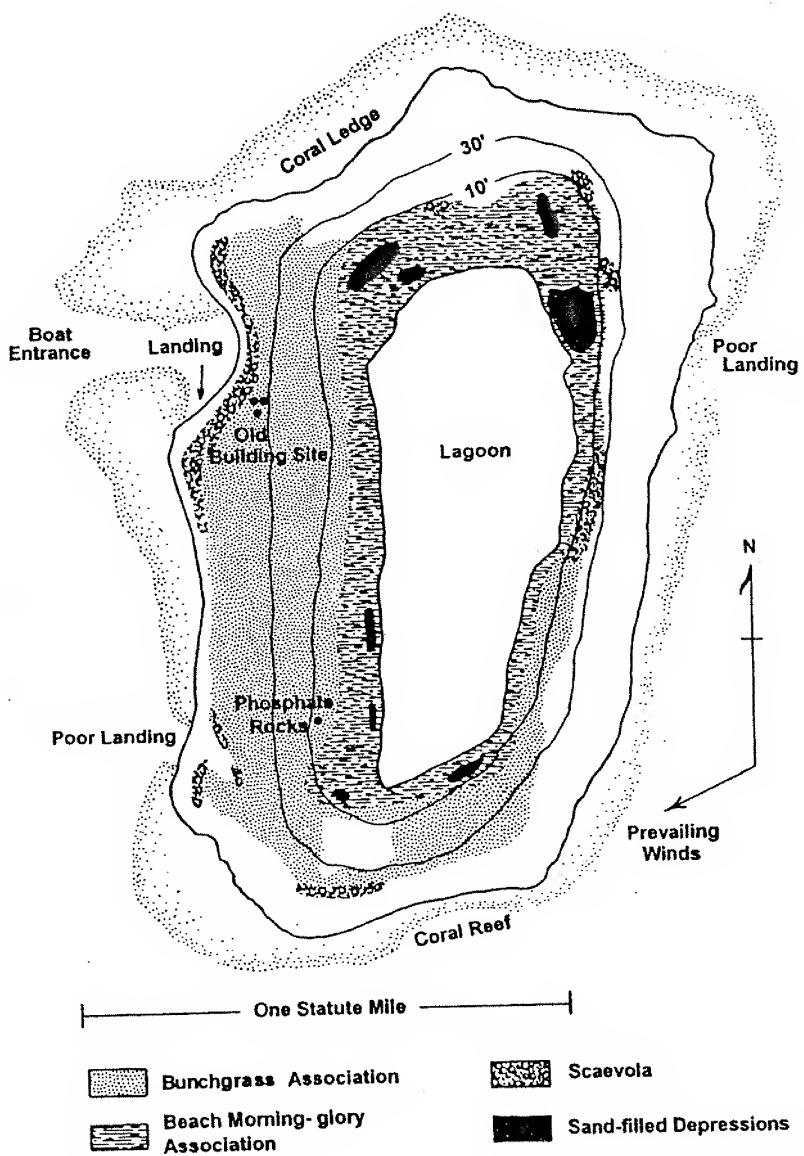
As a three time visitor to Laysan, I knew nothing of Hugo Schauinsland save his attachment to the Hawaiian Monk Seal (*Monachus schauinslandi*). Now we can read his informative and delightfully

written observations of the atolls life, one hundred years after his expedition. We learn that Schauinsland was a gifted young zoologist and museum curator in Bremen Germany when he was granted a year's leave to collect in the Pacific. Hugo begins his trip in Honolulu and with the help of the Guano Company, he gains an invitation to visit Laysan, perhaps his most important stop on an around-the-world collecting trip.

His sense of jingoism is apparent as the German-owned H. Hackfield Company, who leased the guano works at Laysan, provided the ship he sailed on.

"The first reception on board was unforgettable!" he writes. "The sailors band, consisting of a kettledrum, triangle and accordion, tactfully greeted us with the masterly performed, pretty song 'O'Susanna,' which is also very much appreciated amongst us on the banks of the Wiser."

Schauinsland's observations from Laysan include a mix of geology, geography and biology. He reports on the origin of guano, "the only reason why mankind visits this godforsaken island where only birds dwell." His style is quite lyrical, even flowery; typical prose of a Victorian



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adventurer. Yet the observations are unique and important to restoration efforts. For example, we never knew that "The nicest plant on Laysan is, without comparison, a man-sized shrub, {Sandlewood} ... The splendor of the flower lasts only one night; it opens first at sundown and its life comes to an end the next morning when the sun has hardly raised itself above the horizon... Its charm is also increased by its intoxicating highly pleasant fragrance." We never knew that "Not too long ago, palms have also lived on the island, and, as the many remnants of their rotten stumps show, they were very numerous. However, the last living examples died off a few years ago... it is not unlikely that castaways contributed to their demise."

His important observations include extinct plants and their associated avifauna endemic to Laysan. The Laysan honeyeater, millerbird, rail, now extinct and the extant Laysan finch, and duck were tame and abundant. His descriptions of seabirds are less noteworthy but none the less interesting:

"Laysan is a true bird paradise; nowhere on earth is there another place like this. The land birds occupy an inferior position, enduring their role of barely being tolerated by the seabirds who are the dominant and ruling class here. Huge masses of birds come here to breed!...The flocks of storm-petrels (*Haliplana fuliginosa* Peale) that were milling around in the distance, looked like a swarm of bees."

Two days after he arrived, so did the Bonin Petrels. "As if by some stroke of magic, the whole appearance of the island was transformed... One is awestruck by the bird's ability to accurately schedule its arrival time, almost to within an hour; where is the compass that guides its flight through the storms and hurricanes over the vast ocean toward this tiny speck of land?"

"In the last days of October, the first outposts of the magnificent albatross appear, a few days later, from a higher vantage point, the island looks as if it were covered by large snowflakes. There is hardly a spot from which the dazzling white plumage of an albatross does not reflect back."

While Hugo was out collecting specimens, his wife, "day in and day out, she would painstakingly prepare the specimens truly by the sweat of her brow as long as the daylight lasted." She suffered silently as cockroaches ate her fingernails

while she slept but the tiny ants and beetles that ate her labors of love, specimens. "I often found my wife in tears over the lost efforts." All this after she had suffered a serious disease upon arrival. For eight days her condition was guarded, but she recovered only to immerse herself in preparing specimens with mercury, arsenic and old lace.

He leaves the island with the impression that the "animals on Laysan behave as they really are, without any fear. They had not yet learned to consider us their enemy, and therefore, we were constantly in a position (thus unbiased) to study not only their objective behaviour, but also and more specifically, their emotional life and their spiritual character. For example, he notes" the chicks of the stoic albatross exhibit a quiet, agreeable, but somewhat feeble-minded disposition; quite the opposite from the pedantic, eternally fidgeting, sanguinistic tern. The black shearwater (Christmas Shearwater) has a decidedly melancholy disposition... I can only compare to the sighing moans and cries of lament made by a very unfortunate person who is totally depressed about his life and the world." When we look at the population declines of albatross due to longlining, think about the lost landbirds due to introduced rabbits, it easy to relate to the shearwater's depressing lament.

No. 433. In 1923, the Tanager Expedition, a natural history survey of the Northwestern Hawaiian islands and beyond, was headed by Dr. Alexander Wetmore of the National Museum in Washington. Storrs Olson, eminent ornithological paleontologist from the same institution, presents the journal of the expedition leader's field observations. The second journal is by Donald R. Dickey, "an enthusiastic naturalist of independent means" as well as a filmmaker from Los Angeles. The journals are accompanied by black and white photos selected to create a sense of the period of this exploration that we can almost glimpse in the recent past: Wetmore in his beat-up "smoky the bear" hat and wire-rimmed glasses and Dickey in a pith helmet looking like The Professor from Gilligan's Island. From their writing we also learn of the darkest days of Laysan Island. The place experienced by Schaunslund has now been decimated by rabbits introduced by the guano miners in 1903.

In addition to a biological reconnaissance of Central Pacific islands, the Tana-

ger Expedition, a joint effort between the Bureau of the Biological Survey (U.S. Dept. of Agriculture), the Bishop Museum of Honolulu and the U.S. Navy, was a biological 'swat' team to finally rid Laysan of the rabbits. The island was now a wasteland. "Verily the damned rabbits have done their worst," writes Donald Dickey, "As far as I can see with the glasses and from our hurried trip down the island, there is not a living bush or twig or spear of grass left on the whole island outside of the two poor coconuts trees and 3 bushes near the house...In my wildest pessimism I had not feared such utter extirpation of every living plant."

Wetmore writes in a more formal manner, providing rich details of the animal life and expedition details. What comes across to me was his time spent with Eric Schlemmer, son of Max Schlemmer, the man who introduced rabbits to Laysan, ostensible for his kids to play with, as well as for a meat canning business sideline to guano export. Schlemmer who was born on Laysan provided Wetmore a perspective into the Laysan at a time when it was perhaps the grandest island north of the equator (for its' relative size).

I found Dickey's journal more dramatic and personable, for example, as Dickey struggled under the inclement conditions for filming, he wrote of his frustrations and exaltations:

"Set up the camera and soon had a Laysan Finch recorded on film (if all goes well and this cursed 100% humidity does not wreck me.) As I finished I heard a weak but charming song behind me and whirled to find one of our pair of Laysan Honey Eaters singing his heart out for me. Whirled the camera, slammed the focus lever, cranked and think I have him. And before I had recorded the footage and shot Schlemmer came up holding a Laysan Rail in his hand. To get all the footage possible we turned him loose in front of the high speed. Meantime I had held alive & unhurt in my hand one of the two Laysan Rails we know are left on the island, ...To think of getting one of the 3 honeyeaters we know to be alive and one of the 2 rails and one of the finches in lightning succession was indeed luck."

Bad luck soon followed, perhaps provoked by the Expedition members themselves. During a shark killing spree at Kure Atoll {a.k.a. Ocean Island} on April 16, 1923, over 30 sharks were shot out of a school of at least 500. On April 25, as

a stiff wind blew from the NE., Wetmore recalled that "old sailors say the wind is due to the many sharks killed at Ocean Island. The Hawaiian shark god is offended and shows his displeasure in this manner." While the scientists were pinned down, an awesome sandstorm blew into oblivion the last three "Laysan redbirds." The Laysan rails died off in the aftermath. The Laysan ducks and finches barely survived because the ducks ate brine flies at the lake and the finches scavenged on other dead birds. Donald R. Dickey's diary is worth noting at length on this experience:

"Monday 4-23-23 Rain & mist-driving N. gale--clearing to sandstorm in afternoon. Hell of a day..." And now I must pay for my fun!" Awoke to the shattering tune of the tent straining at every peg... Cursed the Sahara of Laysan and decided to declare it Sunday... This afternoon the clouds broke at times, but the gale increased until the whole island seemed to be walking-- a regular cursed sandstorm of the worst sort... Off the south end of the island flaps a regular sand "banner" Life is hell!...to Hell with it and its islands, is the way I feel tonight. Tried scrambled Man-o'-war bird egg tonight. It was doubtless nourishing, but I did not relish my share."

Tuesday 4-24-23. Cloudy--north gale--sand storm. Hell of a day. The gale and blinding sandstorm continues unabated and life in the open or in the tents or tumble-down shacks is equally unbearable. Not much sleep for anyone, but luckily my tent has held so far, by turning the fly loose... Everyone except smiling George, the cook is on edge. Took Eric and plowed out into the stinging blast of sand ... There is not a shearwater burrow entrance visible on higher sand ridges and the island seems almost deserted of birds. A Man-o'-war colony that had a dozen eggs yesterday and another dozen mated couples is deserted except for one male & one female that are sticking to their eggs. The rest have given it up and taken to the air leaving a feast for the curlew."

Wednesday 4-25-23 Broken clouds--NNE. gale --sandstorm (third day) hell on earth. The terrific cold gale and sandstorm continues unabated-- almost unbearable-- getting on our nerves--third day however, wind a trifle E of N and scudding clouds broken with moments of sun, so we pray to heaven it may go down with the sun tonight. Outside sand cuts face like a knife. ... No sign of let-up tonight but

sharp rain squalls are laying the sand. Birds collected today: #40 - Charadrius d. fulvus male, (Golden Plover) found dead-- too weak to survive sand storm that is raging. Many are dying.

Saturday 4-28-23 -Heavy Rain...At last the wind dropped after the worst wind siege I have ever experienced, but only to veer to the east and bring up the first prolonged torrential downpour we have had. We could have caught a cistern full of water had we had a cistern instead of pans & pots & coal oil cans. By 9:00 it had cleared gloriously with the second collection of decent clouds for photography we have had on the island."

The infamous storm was over and some species had vanished forever. Wetmore and Dickey were there to record the end. Storrs Olson provides their journals at a critical time as the restoration of Laysan is contemplated. The transplant of Nihoa Millersbirds to Laysan as well as the revegetation of Laysan while the continued war against Sandbur, the introduced noxious, continues.

No. 434. The final paper, an annotated bibliography of Laysan Island by PSG members Roger B. Clapp, Miklos D.F. Udvardy and Angela Kay Kelper rounds out what is known and reported about this unique island. Even my most obscure papers that I have forgotten about (for good reason) were included. This team of authors, including Storrs Olson and editor Ian G. Macintyre have done a great service in saving from obscurity, valuable journals useful to todays conservationists in Hawaii and anywhere historical biological accounts is appreciated. Mahalo to them.

Mark J. Rauzon

Global Biogeography

Global Biogeography by John C. Briggs, 1995. 472 pages. Volume 14 of Developments in Paleontology and Stratigraphy, Elsevier Science Publishers, Amsterdam - New York. ISBN: 444-88297-9, US\$ 203.

Dr. Briggs is an ichthyologically oriented zoogeographer who is well known as author of the only marine zoogeography (1974) published since Ekman's classic monographs. He further contributed three more books which became more and

more oriented toward the now topical, and controversial, field of historical biogeography. The present book seems to be the culmination of his comprehensive studies: it encompasses both historical and recent biogeography, of animals and plants, marine, freshwater, and terrestrial organisms.

The book is divided into two main parts. Historical biogeography brings us the latest stand of knowledge about the vicissitudes of land and oceans through time, as well as the evolution of every major taxon of plants and animals. The second part treats the present, i.e., contemporary distribution. The eighty-odd pages of marine distribution patterns is well worth reading by anyone dealing with marine organisms. Here we find several of the author's previously launched ideas, e.g. about distribution centers. The descriptive chapters on terrestrial patterns are understandably shorter, more concise.

Two final chapters are significant. One, culminating in Briggs' hypothesis about antitropical distributions (missing in the tropics, but extant at higher latitudes) revives an older hypothesis claiming step-by-step extinctions of once continuous distribution from tropical centers of origin. The chapter on species diversity is an excellent summary of the subject for both marine and terrestrial biologists. We learn not only about latitudinal, but also longitudinal diversity gradients. While E.O. Wilson (1992, The diversity of Life) lists three reasons: more solar energy, more stable climate, and larger area of a taxon to display higher diversity, Briggs now adds a fourth factor: the longer the evolutionary time (of the taxon) the greater is its diversity. This sounds logical. A final emphasis is on the present, anthropogenic loss of diversity, that is more and more evident and menacing (threatening?) the future of our biosphere.

Our readers who specialize in seabird studies ought to be well versed in marine zoogeography. It is just therefore that Briggs' new book needs to have our special attention. The author writes: "In the twenty years period, between 1974 and 1994 a vast amount of literature, containing significant information about the distribution of various marine species, has appeared. There is, in fact, so much that one could no longer do justice to it within the covers of one book." (p.208). Yet, shame on us, there was not one paper about seabirds, let alone a book, that would have caught the interest of Briggs

BOOK REVIEWS

to include into his monumental work, apart of an almost casual mentioning of the known early ancestry of Procellariformes and Sphenisciformes. I hope that some of us would rectify this hiatus in the near future.

M.D.F.Udvary, California State University, Sacramento.

Seafood Industry

1996 Annual Report Of The United States Seafood Industry by Howard M. Johnson. 1996. 99 Pages. H. H. Johnson & Associates, P.O. Box 53146, Bellevue, WA 98015. E-mail:

<hjonso19@mail.nwlink.com>; Telephone: (425)747-2757.

This is certainly among the most documented reports that this reader has encountered, with 95 graphs and 12 tables in the main text, that quantify all aspects of seafood catches and consumption by country and species. This is followed by an appendix of 23 pages of tables supporting all graphic data points.

We learn from the preface this is the fourth in a series of reports "...designed to provide convenient access to information...regarding seafood supply and demand." The report is certainly a broad overview of the industry, focused on international and environmental issues that have or will impact the U.S. seafood industry. The emerging conflict between increasing demand on existing ocean stocks and the expectation of continued harvest and culture of fish and shellfish without negatively affecting sustainable resources or coastal eco-systems help define the scope of this information filled report.

This report is divided into two major sections, global seafood trends affecting the U.S. seafood industry and major

commodity trends. These are proceeded by the short section, 1995 highlights. There, among the interesting facts, we learn that in 1994 world commercial fish and shellfish supplies total 109.6 mmt (million metric ton), a record, and that aquaculture production represented near 25 percent of that, about 18.6 mmt. The U.S. per capita consumption of seafood in 1995 was about 15.0 pounds. U.S. aquaculture production for 1995 was: catfish - 447 million pounds (mp); tilapia - 15 mp; hybrid striped bass - 9 mp; and farm salmon - 34 mp. U.S. edible fish product exports topped 2 billion pounds in 1995, with salmon the leading export (\$729 million). In 1995 the U.S. imported 3.1 billion pounds of seafood products, for \$6.8 billion, including shrimp - 590 mp, and fish block - 210 mp, including 102 mp of pollock. The 1995 wholesale value of seafood was \$18.2 billion, and the retail near \$38.2 billion.

World fishery data indicate that in 1994 catches increased for 48 of the 68 top species. We learn that there has been a shift in the species that are caught in many areas, where high value species such as cod, haddock and flatfish being replaced by low value species such as herring, pilchards and mackerel. Overall, 69% of world fish stocks are classified as depleted, recovering, overfished or fully utilized. A quarter of all fisheries are depleted, overexploited or recovering. The report notes that "...any potential increases in production appear limited to small pelagic stocks."

This sampling of the data contained within the report reflects the enormous scale of the seafood industry and portends the potential difficulties in continuing to harvest seafood stocks while maintaining the biological integrity of the ecosystem wherein they occur. The seafood industry is sensitive to environmental concerns, especially the bycatch of non-target fish, mammals, birds and other marine organisms. The fishing industry has responded to concerns and modifications to gear

have occurred, and more are likely to occur, as reflected in the IUCN resolution on longline bycatch reported in this issue of Pacific Seabirds.

To this writer greatly reducing or eliminating bycatch is a relative simple matter compared to that of maintaining healthy fisheries that can be harvested indefinitely into the future. The report notes the emergence of China as a major consumer of fish products, a country that will at least equal the consumption of Japan. The demand for fish products will certainly continue to increase. How much of the current and future demand can be satisfied by aquaculture is unknown: note that fish feed is often fish meal although alternatives are being developed, and there are environmental concerns specific to aquaculture.

The concern of marine ornithologists is, of course, what impacts, if any, the continued and especially the increased harvesting of marine fisheries will have on marine bird populations. Harvesting large and perhaps biologically significant portions of lower levels of food chains is potentially biologically disruptive and limiting. Do we really understand the consequences of these actions? How long will it take depleted fisheries and their dependent marine bird and mammal populations to recover? Do we have the technical information to recognize biologically significant impacts? If not, what type of effort is required to do so?

To be sure, marine fisheries will continue and the pressure to increase harvest levels, the areas harvested, and the species harvested will increase. Our challenge is learning how to manage these harvested fisheries at biologically meaningful levels. To do so requires technical information of populations, food chains, and their biological and physical interactions: much remains to be done.

Steven M. Speich

BULLETIN BOARD

IN MEMORIAM ROGER TORY PETERSON, R.I.P.

Roger Tory Peterson died in his home at Old Lyme, Connecticut, in July 1996, just short of his 88th birthday. In addition to being one of the great conservationists of the 20th century, he was an author, illustrator and naturalist. He touched the personal and professional life of virtually every member of the Pacific Seabird Group (PSG). Many like myself and Steve Speich cherish our battered and worn copies of our Peterson western field guides. I was introduced to him by the late Ralph Schreiber at the International Council for Bird preservation meeting in Cambridge, England, in 1982, and found him to be shy and modest regarding his accomplishments. Roger Tory Peterson was a member of PSG during most of PSG's existence. He was the founding president of the International Council of Bird Preservation's U.S. Section in 1964, the predecessor of the American Bird Conservancy.

He invented the modern field guide, and over seven million copies of his bird guides were sold in North America. The guides expanded birding far beyond an academic and museum-oriented elite, and converted it into a hobby for millions of ordinary people. By learning the names of birds and other creatures from Peterson's guides, the public began to notice changes in their own natural surroundings. Thus, Peterson fostered the creation of the environmental movement of the 1960s and 1970s. The Peterson Field Guide Series includes at least 46 titles and covers virtually every realm of natural history.

Houghton-Mifflin published Peterson's original *Field Guide to the Birds of the Eastern United States* in 1934, after rejections by four publishers. This was during the depths of the depression, and the publisher cautiously printed only 2,000 copies, and asked Peterson to forgo royalties on the first thousand. A *Field Guide to the Birds of the Western United States* followed in 1941.

These revolutionary field guides were small enough to fit into a birder's pocket,

and were among the first books to include the word "field" in the title. Roger Tory Peterson devised what remains the easiest to use method of bird identification. His schematic and two-dimensional paintings grouped birds that might look similar (regardless of taxonomic relationships), and therefore might be mistaken for each other. To ease comparisons, the birds were usually painted in identical bodily positions. Peterson invented the use of little arrows to point out the field marks that are the cues needed to identify a bird. He greatly simplified written species descriptions to ruthlessly eliminate everything nonessential. Fork-tailed storm-petrels, for example, are "gray; paler below; unlike all other storm-petrels which are blackish."

Roger Tory Peterson was born in 1908 in Jamestown, New York. He joined the Junior Audubon Club at age 11, and participated in five Christmas counts as a teenager. A teacher encouraged him to draw birds, and after graduating high school he went to New York City to study painting. In the early 1930s Peterson was named the artist of the Bronx County Birding Club. This position became the vehicle for his first field guide.

In Peterson's youth, serious ornithologists usually carried small shotguns to verify their identifications and obtain acceptable locality records by collecting specimens. Identification guides were typically long-winded, much too large and heavy to be taken into the field, and written in academic jargon. Peterson had been exasperated by the descriptions in Frank M. Chapman's *Handbook of Birds of Eastern North America* which began with the bill and trudged systematically back to the tail. The obscure anatomical differences used to differentiate similar species were most useful with a dead bird in hand so that the specimen could be matched to an excruciatingly detailed description or compared with stuffed specimens in a museum drawer. Peterson was among the first to grasp the potential for a book that would help people identify live birds. He improved upon Chester Reed's 1909 *Guide to the Land Birds East of the Rockies* which classified by color and size. Peterson took the vantage point of the birder who may have only a few sec-

onds, often in poor light, to identify a bird correctly through binoculars.

Among the many remarkable aspects of Peterson's work is that he painted each bird, wrote the text, and edited the entire field guide. By contrast, the National Geographic guide of the 1980s was the work of 16 artists and 30 writers.

In the twilight of his life, Peterson became a legend. He was recognized by naturalists most anywhere in the world, and was treated as an Audubon or a Darwin. He assisted the careers of younger biologists, and in my case graciously said some kind words about my *Seabirds of Hawaii: Natural History and Conservation* in the galley proof stage, enabling the publisher to include his comments on the cover. An equally famous French oceanographer never answered my letter. Roger Tory Peterson retains a special place within my own family: every household has a least one of his guides. My 91 year old grandmother still had her 1941 edition of *A Field Guide to the Birds of the Western States* in her Nebraska home when she passed away this summer, and my aunt is the lucky recipient of this family heirloom.

Craig Harrison

MIDWAY ATOLL NATIONAL WILDLIFE REFUGE CREATED

THE WHITE HOUSE

Office of the Press Secretary, November 1, 1996, For Immediate Release

EXECUTIVE ORDER

ADMINISTRATION OF THE MIDWAY ISLANDS

By the authority vested in me as President by the Constitution and the laws of the United States of America, including section 48 of the Hawaii Omnibus Act, Public Law 86-624, and section 301 of title 3, United States Code, it is hereby ordered as follows:

BULLETIN BOARD

Section 1. The Midway Islands, Hawaiian group and their territorial seas, located approximately between the parallels of 28 degrees 5 minutes and 28 degrees 25 minutes North latitude and between the meridians of 177 degrees 10 minutes and 177 degrees 30 minutes West longitude, were placed under the jurisdiction and control of the Department of the Navy by the provisions of Executive Order 199-A of January 20, 1903, and Part II of Executive Order 11048 of September 4, 1962, and are hereby transferred to the jurisdiction and control of the Department of the Interior. The provisions of Executive Order 199-A of January 20, 1903, and the provisions of Executive Order 11048 of September 4, 1962, that pertain to the Midway Islands are hereby superseded.

Section 2. The Midway Islands Naval Defensive Sea Area and the Midway Islands Naval Airspace Reservation are hereby dissolved. The provisions of Executive Order 8682 of February 14, 1941, as amended by Executive Order 8729 of April 2, 1941, are hereby superseded.

Section 3. (a) The Secretary of the Interior, through the United States Fish and Wildlife Service, shall administer the Midway Islands as the Midway Atoll National Wildlife Refuge in a manner consistent with Executive Order 12996 of March 25, 1996, for the following purposes:

- (1) maintaining and restoring natural biological diversity within the refuges;
- (2) providing for the conservation and management of fish and wildlife and their habitats within the refuge;
- (3) fulfilling the international treaty obligations of the United States with respect to fish and wildlife;
- (4) providing opportunities for scientific research, environmental education, and compatible wildlife dependent recreational activities; and
- (5) in a manner compatible with refuge purposes, shall recognize and maintain the historic significance of the Midway Islands consistent with the policy stated in Executive Order 11593 of May 13, 1971.

Section 3. (b) The Secretary of the Interior shall be responsible for the civil ad-

ministration of the Midway Islands and all executive and legislative authority necessary for that administration, and all judicial authority respecting the Midway Islands other than the authority contained in 48 U.S.C. 644a.

Section 4. Any civil or criminal proceeding that is pending under the Midway Islands Code, 32 C.F.R. part 762, upon the date of this order, shall remain under the jurisdiction of the Secretary of the Navy. Actions arising after the date of this order are the responsibility of the Secretary of the Interior and shall be administered pursuant to regulations promulgated by the Secretary of the Interior.

Section 5. To the extent that any prior Executive order or proclamation is inconsistent with the provisions of this order, this order shall control.

Section 6. Nothing in this order shall be deemed to reduce, limit, or otherwise modify the authority or responsibility of the Attorney General of the United States to represent the legal interests of the United States in civil or criminal cases arising under the provisions of 48 U.S.C. 644a.

William J. Clinton, THE WHITE HOUSE, October 31, 1996.

MEDMARAVIS NEWS

From MEDMARAVIS News we learn, among other things, that the group can be accessed on the web: <<http://www.mmssoft.fr/monoweb/medmaraxm>>. The *Second Forum of the Alghero Convention on Coastal and Marine Biodiversity in the Mediterranean* will take place at the Alghero, 27-30 March 1997. The *5th Pan-Mediterranean Seabird Symposium* will be held in Malta during September 1998. Upon the request of the Sardinian Autonomous Region and the City Council of Porto Torres, MEDMARAVIS is organizing a 3-day specialized *International Symposium on Management of Protected Island Ecosystems in the Mediterranean*, to be held 6-8 September 1996. In March 1996 MEDMARAVIS published the *Coastal and Marine Biodiversity of the Mediterranean*. For further information visit their web site

or contact the secretary, e-mail: <medmaraxm@pacwan.mm-soft.fr>.

IUCN URGES GREATER PROTECTION FOR SEA-BIRDS IN LONGLINE FISHERIES

(23 October 1996 -- Montreal) Two leading US environmental groups, the Environmental Defense Fund (EDF) and Defenders of Wildlife, praised the International Union of the Conservation of Nature (IUCN) for adopting today a resolution that calls for the widespread use of measures that would prevent seabirds from getting hooked and drowned on commercial fishing lines. EDF and Defenders of Wildlife authored the resolution, which was cosponsored by 17 conservation groups and is strongly supported by the United States, Australia, New Zealand and other governments.

Scientists agree that longline fishing severely impacts at least 13 species, three of which are globally threatened with extinction. A longline can be up to 80 miles long, carrying several thousand baited hooks. Worldwide, an estimated 180,000 birds die on hooks each year in tuna, swordfish, sablefish, and other longline fisheries. One of the birds most at risk is the Wandering Albatross, among the world's most magnificent birds. It has a 10-foot wingspan and can glide over thousands of miles of ocean in a month.

"Tragically, about 10 percent of the world's Wandering Albatross population is killed each year by longlines," said Jim Wyerman, Defenders of Wildlife Vice President.

Dr. Rod Fujita, an EDF scientist, noted that, "Some fishermen are already trying hard to avoid killing seabirds."

For example, fishermen of the North Pacific are adapting techniques that have worked elsewhere and are developing new methods to reduce seabird mortality." He went on to say that, "The North Pacific Longline Association (NPLA) has even proposed new regulations that incorporate many of the measures described in the IUCN resolution."

Dr. Charles Wurster, an ornithologist and EDF trustee, emphasizes that, "These great oceanic birds are a visible signal of the health of the oceans -- and many are in

decline. Fortunately, practical solutions exist. By preventing birds from going after bait, more fish can be caught."

Fishermen can minimize conflicts with seabirds by putting extra weight on lines to make bait sink faster, by setting hooks at night, and by using streamer lines that scare birds away.

Seabird bycatch and other international conservation problems have been considered at the IUCN assembly convened at Montreal's Palais Des Congres from October 14 - 23. The largest gathering of conservationists since the 1992 Earth Summit in Rio, this IUCN meeting has attracted approximately 2,500 representatives from 144 nations.

Defenders VP Jim Wyerman concluded that, "Measures to avoid hooking seabirds need to become widespread throughout the global longlining fleet. The IUCN resolution is a positive first step."



REPORT OF THE TREASURER - 1996

REPORT OF THE TREASURER OCTOBER 1, 1995 TO SEPTEMBER 30, 1996

Income and Expenses

The gross income for the year was \$48,696.84 of which \$30,349.11 (62%) was from grants for special projects. This included \$18,049.11 for the EVOS workshop and subsequent publication, \$12,000 for the Seabird Monitoring Database project, and \$300 to publish a brochure about Marbled Murrelets. Income from the Victoria annual meeting was \$2,945.32, although \$2,303.48 of this was repayment of PSG's loan to the meeting committee. Membership dues accounted for \$8,435.23 (17%), and interest and dividend income provided \$4,410.68 (9%). Income from publication sales was \$1,656.50, this includes sales of 69 copies of the Marbled Murrelet symposium. \$600 was given for the PSG endowment. Expenses totaled \$43,530.58 with the EVOS workshop being our largest ex-

pense at \$29,049.16 (67%). The production of two issues of *Pacific Seabirds* cost \$5,311.61 (12%), officer and committee expenses were \$2,604.78 (6%), and expenses for publications were \$2,532.81 (6%), which included the purchase of 500 copies of the Marbled Murrelet symposium volume for resale.

Endowment Accounts

On September 30, 1996 the PSG endowment was worth \$55,069.53. On July 15, 1996, in response to the change in the bylaws that allows the endowment funds to be placed in a mutual fund, the endowment committee (Malcolm Coulter, Craig Harrison and Jan Hodder, treasurer) sold 1,376.147 shares of Dean Witter U.S. Government Securities Trusts at \$8.72 per share resulting in \$12,000. This amount was then invested in 513.04 shares of

Neuberger & Berman Management Inc.'s Guardian Fund.

Membership

As of September 30, 1996 PSG membership totaled 410, of which 55 are life members, 30 are family members and 20 are student members. Forty-five new members have joined PSG this year. A total of 110 members did not renew this year. Of the 65 members whose registration fees for the San Diego meeting included a 1995 PSG membership only 16 renewed for 1996. Twenty-six libraries have paying subscriptions to *Pacific Seabirds*.

Jan Hodder,
Treasurer

Table 1. Pacific Seabird Group Balance Sheet, September 30, 1996

Account	Balance	
	September 30, 1996	October 1, 1995
Annual Meeting - Portland	\$1,500.00	-
¹Endowment Accounts		
Dean Witter US Gov. Securities	\$45,106.94	\$53,599.13
Neuberger and Berman Guardian Fund	\$12,626.93	-
Publications Accounts		
Bulletin Account (M. Springer ed.)		\$2,985.77
Pacific Seabirds Account (S. Speich ed.)	\$168.20	-
²Savings Account - Dean Witter	\$32,416.77	\$16,884.03
Special Projects Accounts		
EVOS Workshop and Publication	\$17,619.43	\$28,619.48
Treasurer's Checking Account	\$1,713.97	\$2,454.56
³United Kingdom Membership Account	\$225.29	\$722.17
Total Assets	\$111,377.53	\$105,265.14
Liabilities and Equity		
⁴Liabilities	\$29,619.43	\$32,319.48
Equity	\$81,758.10	\$72,945.66
Total Liabilities and Equity	\$111,377.53	\$105,265.14

Footnotes

¹ Total reflects actual amount deposited or interest earned. Deposits are made by purchasing shares, the dollar amount of which fluctuates with the market. On September 30, 1996 we had 4,734.643 shares of Dean Witter U.S. Government Securities trust valued at \$8.81 per share (value \$41,712.20), and 539.69 shares of

REPORT OF THE TREASURER

Neuberger and Berman's Guardian Fund at \$24.75 per share (value \$13,357.33). If assets and equity are calculated using these share prices instead of the dollars deposited, the balance sheet totals for 1995/96 would be \$108,713.19 and \$79,093.76 respectively compared with the January 1 - September 30, 1995 totals of \$103,305.42 and \$70,985.94 respectively.

² Includes \$12,000 from the US Fish and Wildlife Service for the Seabird Monitoring Database project.

³ The United Kingdom account is managed by Mark Tasker and is used for deposits of membership dues paid in pounds sterling. A conversion rate of £1.00 to \$1.61 was used.

⁴ \$17,619.43 for the EVOS publication and \$12,000 for the Seabird Monitoring Database project.

Table 2. Pacific Seabird Group Cash Flow Report, 1 October 1995 - 30 September 1996

Income	
Annual meeting - Victoria	\$2,945.32
¹ EVOS	\$18,049.11
Grant from the USFWS for the Seabird Monitoring Database project	\$12,000.00
Grant from USFWS for marbled murrelet brochure	\$300.00
² Gifts for the PSG endowment	\$600.00
Income dividend (Savings account Dean Witter)	\$1,185.79
Income dividend (Endowment account Dean Witter)	\$3,147.81
Income dividend (Endowment account Neuberger & Berman)	\$26.93
Interest earned on checking accounts	\$50.15
Life membership dues	\$360.00
³ Membership dues	\$8,075.23
Page charges for marbled murrelet symposium	\$300.00
Publication sales	\$1,656.50
	\$48,596.84
Total Income	
 Expenses	
Annual meeting - Portland	\$1,500.00
Bank charges	\$82.50
⁴ Dues	\$650.00
EVOS Workshop	\$29,049.16
Officer and Committee expenses	\$2,604.78
<i>Pacific Seabirds</i>	\$5,311.61
Page charges for marbled murrelet symposium	\$1,450.00
Publications	\$2,532.81
Student wages	\$339.72
Taxes	\$10.00
	\$43,530.58
Total Expenses	
	\$5,066.26
Total Income over Expenses	

Footnotes

¹ Includes a \$15,000 grant from the US Fish and Wildlife Service to write and publish a book on the 1995 seabird restoration workshop sponsored by the EVOS trustees.

² \$500 from Schuessler Knitting Mills, \$100 from Dennis Michaels.

³ Includes \$584 transferred from the U.K. account for dues for 1996 and previous years.

⁴ Ornithological Council \$500, Bird Conservation Alliance \$150.

PUBLICATIONS



A SYMPOSIUM OF THE PACIFIC SEABIRD GROUP

BIOLOGY OF MARBLED MURRELETS: INLAND AND AT SEA

S. KIM NELSON AND SPENCER G. SEALY (editors)

in NORTHWESTERN NATURALIST, Volume 76, Number 1, 1995

CONTENTS

Introduction by S. K. Nelson and S. G. Sealy

Inland

Marbled murrelet activity relative to forest characteristics in the Naked Island Area, Prince William Sound, Alaska by K. J. Kuletz, D. K. Marks, N. L. Naslund and M. B. Cody

Tree and habitat characteristics and reproductive success at marbled murrelet tree nests in Alaska by N. L. Naslund, K. J. Kuletz, M. B. Cody and D. K. Marks

Description of two marbled murrelet tree nests in the Walbran Valley, British Columbia by I. A. Manley and J. D. Kelson

Characteristics of three marbled murrelet tree nests, Vancouver Island, British Columbia by K. M. Jordan and S. K. Hughes

Marbled murrelet distribution in the Siskiyou National Forest of southwestern Oregon by C. P. Dillingham, R. C. Miller and L. O. Webb

Two marbled murrelet nest sites on private commercial forest lands in northern California by S. J. Kerns and R. A. Miller

Behavior of marbled murrelets at nine nest sites in Oregon by S. K. Nelson and R. W. Peck

Fledgling behavior, flight patterns, and forest characteristics of marbled murrelet tree nests in California by S. W. Singer, D. L. Suddjian and S. A. Singer

Use of boat-based surveys to determine coastal inland habitat associations of marbled murrelets in Prince William Sound, Alaska by D. K. Marks, K. J. Kuletz and N. L. Naslund

Use of radar to study the movements of marbled murrelets at inland sites by T. E. Hamer, B. A. Cooper and C. J. Ralph

At Sea

Preliminary observations on juvenile:adult ratios of marbled murrelets in Auke Bay, southeast Alaska by H. L. Anderson and S. R. Beissinger

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BIOLOGY OF MARBLED MURRELETS - INLAND AND AT SEA. S. Kim Nelson and Spencer G. Sealy (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Seattle, Washington, February 1993. Published 1995 in North-western Naturalist, Volume 76, Number 1. \$20.00.

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